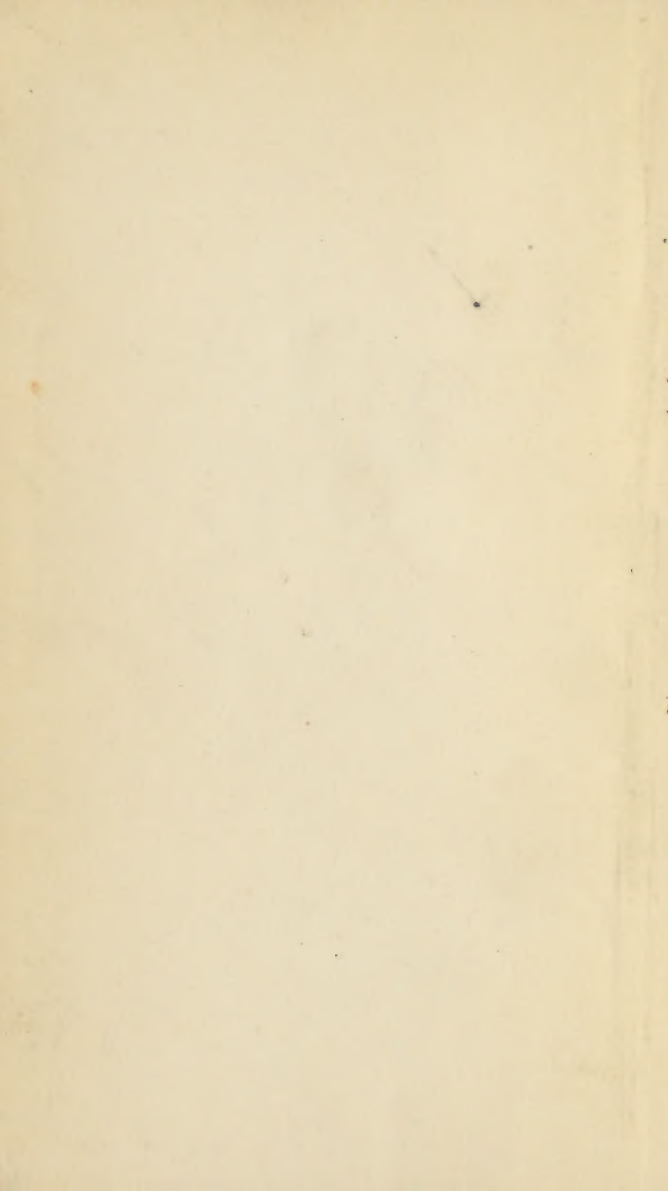


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ESSENTIALS
OF
PRESCRIPTION WRITING
—
EGGLESTON

Second Edition
Revised

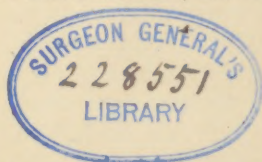


ESSENTIALS OF PRESCRIPTION WRITING

✓
BY

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SECOND EDITION, RESET

PHILADELPHIA AND LONDON

W. B. SAUNDERS COMPANY

1917

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No. 2

PREFACE TO SECOND EDITION

FOUR years have elapsed since the appearance of the first edition, during which time the author has used this volume in the teaching of prescription writing. The exhaustion of the first edition now gives an opportunity to improve the book in a number of minor respects and a few major ones. These improvements have included extensive revision of the chapters on Latin Grammar and the Grammatic Construction of the Prescription, portions of which chapters have been entirely rewritten to make them more complete and to further simplify the labors of the student. The chapter on vehicles has been amplified by the addition of new material on the subject of coloring in order to give the student a more definite idea of the amounts of the various coloring agents required for the production of the several shades and tints, and to aid him in their use in other ways. A short statement of the influence of the Harrison Antinarcotic Law on the writing of prescriptions has been included, together with a typical prescription as it should be written under the law's restrictions. Considerable amplification has been made of the chapter on Suggestions for Prescribing Official Preparations and a list of twenty-five representative practice prescriptions has

been added to the volume. There is hardly a page in which some alteration has not been made in the hope of improving it. With all of these changes, however, the original plan of the work has not been altered and its length has not been increased materially. It still remains an effort, "To provide the student of medicine with a succinct, yet sufficient, treatment of the subject of prescription writing."

CARY EGGLESTON.

NEW YORK CITY,
November, 1917.

PREFACE

THIS small volume is intended to provide the student of medicine with a succinct, yet sufficient, treatment of the subject of prescription writing. It is designed to carry him through the subject in a sequential manner, and to prepare him to construct a grammatic and proper prescription to fill any need. The work is a crystallization of the author's experience in teaching the subject, and has been prepared with a view of reducing the burden of the already overworked student. The author's greatest gratification will come from the realization that he has accomplished his purpose, even in small measure.

Second only to the pleasure of having his desire fulfilled is the pleasure that the author derives from expressing his gratitude to Dr. Robert A. Hatcher, who has given him inspiration and encouragement during the preparation of these pages, and who has kindly and critically read them and made many valuable suggestions which have done much to enhance the worth of the volume.

CARY EGGLESTON.

NEW YORK CITY,

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ESSENTIALS OF PRESCRIPTION WRITING

CHAPTER I

INTRODUCTION

THE object in offering the following pages is to supply to the student and the practitioner a concise presentation of the fundamental principles which underlie the art of prescription writing, stripped of all that is not essential to their clear comprehension. The desirability of such a presentation is evident to many who teach this subject, for, despite the fact that there are many text-books which treat the subject with greater or less comprehensiveness, the existing works are, in general, either too brief to be of much use, or they are too extensive to be readily helpful to the one seeking information.

It has been my endeavor to carry the student, in a more or less sequential manner, through the several fundamental steps, including the Latin grammar, up to the construction of a proper prescription, and to offer some suggestions as to flavoring, coloring, modes of prescribing the official preparations, and points in the avoidance of incompatibility. Matters of therapeutics and of pharmacology find no places in these pages,

and in the material presented suggestion, rather than dogmatism, is the key-note of the discussion. The practical needs have been allowed to determine both the scope of the presentation and the degree of detail with which any phase of the subject is considered.

The official drugs and preparations used in prescription writing are those which are described in the Pharmacopeia and, in this country, in the National Formulary. It is well to have a clear idea at the start of the scope of these works.

A pharmacopeia is a book containing a list of drugs and formulas, and directions for the preparation of medicines.

The **Pharmacopeia of the United States**, or **The Pharmacopeia**, is a book of drugs and formulas, containing directions for the preparation of galenicals, and includes descriptions of mineral, vegetable, and animal drugs, together with tests for establishing the identity and quality of these, and with specifications as to the purity and strength of drugs.

The title is commonly abbreviated to U.S.Ph. or U.S.P.

The U.S.P. is revised and published decennially by a committee of revision, which is appointed by a national convention composed of representatives from medical and pharmaceutic colleges and associations which have been incorporated for not less than five years prior to the meeting or which were represented at the previous convention, and by representatives of certain departments of the Government. The

pharmacopeial convention meets decennially in Washington. Revision requires several years, and, therefore, the publication takes place from three to five, or more, years after the date of the convention, which is the date assigned to the revision. The latest meeting of the convention was held in May, 1910, and the revision then undertaken has been completed. The Pharmacopeia now official is the ninth revision. Its title is abbreviated to U.S.P. IX.

Each country has a pharmacopeia which serves as a standard within its realm, the British Pharmacopeia (B.P.) being the foreign one best known in this country.

The **National Formulary** is a book of formulas and drugs, mainly at one time included in the U.S.P. or the B.P. It is issued by a committee of revision appointed by the American Pharmaceutical Association, and its revision has been at irregular intervals. It is commonly referred to by the abbreviation N.F. The latest edition is the fourth (N.F. IV) and appeared in 1916.

Both the **United States Pharmacopeia** and the **National Formulary** are privately published and revised, but, by act of Congress, the last revision of each is adopted as the legal standard for the preparation and purity of the contained drugs. It was the Food and Drugs Act of June 30, 1906, which first placed the National Formulary on the same legal basis as the Pharmacopeia. This is the act commonly known as the "Pure Food Law."

Drugs and preparations which are included in

either the U.S.P. or the N.F. are spoken of as **official**.

Galenical preparations are those which are made by physical as distinguished from chemic means, such as tinctures, infusions, etc. This distinction sharply separates them from such as are made synthetically.

THE PRESCRIPTION

A prescription may be defined as: *A physician's written order for one or more medicinal agents, together with his directions to the pharmacist for their preparation, and to the patient for their use.* This definition covers the meaning of the word in its narrower sense—that in which we shall use it in the succeeding pages. In its broad sense the term includes any recommendation, written or verbal, by a physician to a patient for any remedial measure—medicinal, dietary, physical exercise, change of climate, etc.

A complete prescription should include the following parts, arranged as shown:

1. SUPERScription . . . R.

{	Name of basis	amount
	Name of adjuvant	amount
	Name of corrective	amount
	Vehicle	amount
2. INSCRIPTION
3. SUBSCRIPTION Mix, etc.
4. SIGNATURA Sig: Take one teaspoonful after each meal.
5. Name of patient Mr. Smith.*
6. Name of prescriber J. Medicus, M.D.
7. Date April 4, 1912.*

* One may use his own preference in the location of the name of the patient and the date. Many prefer to place one or both above the body of the prescription.

1. The **superscription** is the primary order. It is written *R̄.*, and is the abbreviation of the Latin word *recipe*, which means *take* (thou). It is a command, and has as its object the quantities of the drugs mentioned in the inscription.

2. The **inscription** is the body of the prescription, and is composed of the official names of the drugs which are to be used, along with those of such solvents, diluents, coloring or flavoring agents, or other vehicle as may be requisite or desired for the perfection of the preparation. The inscription is written in Latin.

3. The **subscription** comprises the necessary directions to the pharmacist for the proper preparation or compounding of the several ingredients for use by the patient. The subscription is also written in Latin.

4. The **signatura** gives the necessary directions to the patient for his use of the preparation. These directions should include the size of the dose, the frequency of its repetition, the necessity for its dilution or other modification, and such other information as may be needed to guide the patient in its safe and proper use. The signatura is to be written in English in the form in which it is intended to appear upon the label, on to which the pharmacist should copy it *verbatim*.

In the prescription the signatura is usually indicated by either of the following abbreviations of the Latin word *signa*: *S.*, *Sig.*,—of these, the latter is to be preferred. Certain well-known abbreviations are frequently employed in the

writing of the signatura, and, while their use is not strictly correct, custom and facility combine to render such a practice permissible. These abbreviations will be found in a table given in Chapter II.

CHAPTER II

LATIN GRAMMAR

THE principal portions of the prescription are written in Latin, and consequently some knowledge of Latin grammar becomes an essential prerequisite. The grammar of the Latin language is both extensive and complex, but for the needs of prescription writing certain rudiments only are required, especially in the present day of simple prescriptions. An effort has been made in this chapter to select and present, in a simple and concise manner, all that is essential as a working basis. While a sharp limitation has been placed upon what has been chosen, it is believed that the limits have been wide enough to serve practically all the needs of the practitioner. To those who already have a good knowledge of Latin, much will appear to be quite unnecessary, but to him who knows nothing of the language, there is little which will be found to be superfluous. For a more detailed and more comprehensive presentation of the Latin grammar the reader is referred to Howe's and Beard's Latin for Pharmacists or Robinson's Latin Grammar of Pharmacy and Medicine. No definitions will be given of such terms as are common in the grammar of the English language, and brief ones only of those peculiar to the Latin.

The use of Latin in the prescription has been preserved for several reasons, among which may be mentioned: That it is the language of scientific nomenclature; being a dead language, it is less liable to alteration than are the modern languages; it is fairly widely understood; it is the language of pharmacopeial nomenclature, and, as there is only one Latin official name for a given substance, confusion is not likely to occur.

NOUNS

Latin has no article, and the declension of nouns is accomplished by changes in their terminations. There are six cases: the nominative, genitive, dative, accusative, ablative, and vocative. The dative and vocative may be omitted, as they are almost never used for prescription writing. The ablative is used but seldom, and it will be given in light-faced type in the paradigms which follow. These paradigms have been arranged so as to give the three most important cases first, and in heavy-faced type, to direct attention to their importance. The genitive of the Latin corresponds to the possessive of English; the accusative, to the English objective. In the absence of the article, definiteness or generality is usually determined by the context.

Gender in Latin does not follow the rules of sex closely, as in English. Many names of inanimate objects are either masculine or feminine. The gender of a noun is generally indicated by its ending. Indeclinable nouns are neuter.

Latin has five declensions and some indeclinable words. The declensions are determined by the final letter of the stem of the noun and by the case-ending of the genitive singular. The declension is accomplished by combining the stem with the proper terminations. When the stem ends in a consonant it is found by dropping the case ending of the genitive singular. When it ends in a vowel, it is found by substituting the characteristic vowel for the case-ending of the genitive singular. The termination is the case-ending which is to be added to the stem. In vowel-stems the vowel of the termination combines with the final vowel of the stem.

Plurals are seldom used in prescription writing except for pills, powders, etc.

THE DECLENSIONS

First Declension.—Nouns in the first declension end in **a** or **e** in the nominative singular. They are of the feminine gender. Those ending in **e** are from the Greek.

PARADIGMS

Case	Singular	Plural	Singular	Plural
Nom.	mistura a	mistur ae	alo e	Endings the
Gen.	mistur-ae	mistur-arum	alo es	same as for
Acc.	mistur am	mistur as	alo en	nouns in-a.
Abl.	mistur-a	mistur-is	alo-e	

The important endings of the first declension are:

	Singular	Plural
Nouns in -a	Nouns in -e	Both nouns
Nom. -a	-e	-ae
Gen. -ae	-es	-arum
Acc. -am	-en	-as
Abl. -a	-e	-is

Second Declension.—Nouns in the second declension end in the nominative singular in **-us**, **-er**, and **-os** (masculine) and **-um** and **-on** (neuter). Those ending in **-os** and **-on** are from the Greek. Those ending in **-er** are irregular in the nominative singular only and are declined like those in **-us**. Those ending in **-os** form the accusative singular in **-on**, otherwise being declined like those in **-us**.

PARADIGMS

<i>Case</i>		<i>Singular</i>		
Ending in: -us		-um	-on	
<i>Nom.</i>	syrup us	acid-um	haematoxyl	on
<i>Gen.</i>	syrup i	acid i	haematoxyl	i
<i>Acc.</i>	syrup-um	acid-um	haematoxyl	on
<i>Abl.</i>	syrup-o	acid-o	haematoxyl	o
<i>Case</i>		<i>Plural</i>		
Ending in: -us		-um	-on	
<i>Nom.</i>	syrup-i	acid-a	Plural the same as in the case of nouns ending in -um .	
<i>Gen.</i>	syrup orum	acid orum		
<i>Acc.</i>	syrup os	acid-a		
<i>Abl.</i>	syrup-is	acid-is		

The important endings of the second declension are:

	<i>Singular</i>			<i>Plural</i>	
Ending in:	us	um	on	-us	um and -on
<i>Nom.</i>	-us	-um	-on	-i	-a
<i>Gen.</i>	-i	-i	-i	-orum	-orum
<i>Acc.</i>	-um	-um	-on	-os	-a
<i>Abl.</i>	-o	-o	-o	-is	-is

Third Declension.—Nouns in the third declension vary greatly in their nominative forms, and for the determination of their declension it is necessary to know both the nominative and the genitive singular cases. In general, the consonant stems may be found by dropping the case-ending of the genitive singular. Masculine and

feminine are declined alike; the neuter differs somewhat from these.

PARADIGMS

	<i>Singular</i>		<i>Plural</i>	
	<i>Masculine</i>	<i>Neuter</i>	<i>Masculine</i>	<i>Neuter</i>
<i>Nom.</i>	aceta -s	lac	acetat es	lact a
<i>Gen.</i>	acetat is	lact is	acetat-um	lact-um
<i>Acc.</i>	acetat em	lac	acetat es	lact-a
<i>Abl.</i>	acetat-e	lact e	acetat-ibus	lact-ibus

The important endings of the third declension are:

	<i>Singular</i>		<i>Plural</i>	
	<i>Masculine and Feminine</i>	<i>Neuter</i>	<i>Masculine and Feminine</i>	<i>Neuter</i>
<i>Nom.</i>	-(s)*	-	-es	-a
<i>Gen.</i>	-is	-is	-um	-um
<i>Acc.</i>	-em	-	-es	-a
<i>Abl.</i>	-e	-e	-ibus	-ibus

NOTE.—While there are many stems in the third declension other than those already indicated, for the purposes of this presentation it will suffice to give the above only, as, regardless of the stem, the case-endings remain the same.

The gender of nouns in the third declension follows certain general rules: 1. Nouns ending in **-or** are masculine. 2. The names of acid radicals ending in **-as** and **-is** are masculine. 3. Nouns ending in **-as**, **-is** or **-x**, and **-io** are usually feminine. Some of those ending in **-is** do not change in the genitive singular, others lengthen. Those ending in **-x** have stems ending in **c**, and where **e** precedes the **x** it is changed to **i** in cases other than the nominative. 4. Nouns ending in **-ol** or **-ma** are neuter, the latter being

* The **s** is added in the nominative in the case of nouns the stems of which are mute.

of Greek origin. 5. An exception to the rule for feminines is *cortex*, which is masculine.

PARADIGM

	<i>Singular</i>	<i>Plural</i>
<i>Nom.</i>	theobroma	theobromat-a
<i>Gen.</i>	theobromat is	theobromat um
<i>Acc.</i>	theobroma	theobromat-a
<i>Abl.</i>	theobromat e	theobromat ibus (is)

(The stems of these Greek nouns end in t .)

Fourth Declension.—The nouns of the fourth declension are masculine and have stems ending in **-u**. They are very few in number in medicine.

PARADIGM

	<i>Singular</i>	<i>Plural</i>
<i>Nom.</i>	spiritu-s	spiritu-s
<i>Gen.</i>	spiritu-s	spiritu-um
<i>Acc.</i>	spiritu-m	spiritu-s
<i>Abl.</i>	spiritu	spirit -ibus

The nouns of this declension commonly used in prescription writing are:

fructus	fruit
haustus	drink, draught
potus	drink
quercus	oak
spiritus	spirit

(The word *potio*, *potionis*, in the third declension is also used to mean drink.)

Fifth Declension.—Practically the only nouns of the fifth declension which are in common use in prescription writing are **species** and **dies**. The word for day, *dies*, is masculine. All the other nouns in the fifth declension are feminine.

PARADIGM

	<i>Singular</i>	<i>Plural</i>
<i>Nom.</i>	dies	dies
<i>Gen.</i>	diei	dierum
<i>Acc.</i>	diem	dies
<i>Abl.</i>	die	diebus

Nouns are governed as to case by the grammatic construction of the sentence and by certain prepositions. Some idiomatic expressions also require the use of a specific case.

The number of nouns which occur as names of the official drugs and preparations is limited, and, for the sake of further aiding the student, the following general rules may be given to cover the two most commonly used cases, the genitive and the accusative:

GENERAL RULES FOR THE FORMATION OF THE GENITIVE CASE

1. Nouns ending in **a** in the nominative singular form the genitive singular in **ae**.

Exceptions are: The Greek nouns ending in **-ma**, and **folia**, which is nominative plural; gen. **foliorum**.

2. Nouns ending in **-us**, **-um**, **-os**, **-on** in the nominative singular form the genitive singular in **-i**.

The following are exceptions: **rhus**, gen. **rhois**; **flos**, gen. **floris**; **erigeron**, gen. **erigerontis**; and those belonging to the fourth declension, which do not change in the genitive.

3. Other nouns, regardless of the ending in the nominative singular, form the genitive in **-s** or

-is. In some the termination is lengthened, thus:

Ending in	as, gen.	atis	as	acetas	gen.	acetatis
" "	is,	idis	"	anthesis	"	anthesis
" "	-o,	-onis	"	pepo	"	peponis
" "	-x,	-cis	"	cortex	"	corticis

Other examples are: **asclepias**, gen. **asclepiadis**; **mas**, gen. **maris**; **phosphis**, **sulphis**, etc., gen. **phosphitis**, **sulphitis**, etc.; **mucilago**, gen. **mucilaginis**; **pulvis**, gen. **pulveris**, etc.

4. The following official names do not change in the genitive singular: **Cannabis**, **coptis**, **digitalis**, **hydrastis**, **hypophysis** and **sinapis**, and the nouns of the fourth declension.

GENERAL RULES FOR THE FORMATION OF THE ACCUSATIVE CASE

1. Nouns ending in **-a** in the nominative singular form the accusative singular in **-am**; the accusative plural, in **-as**.

2. Nouns ending in **-us** in the nominative singular form the accusative singular in **-um**; the accusative plural, in **-os**; except the members of the fourth declension, which do not change in the accusative plural.

3. Nouns ending in **-um** in the nominative singular form the accusative singular in **-um**; the accusative plural, in **-a**.

4. Nouns ending in **-is** in the *genitive singular* form the accusative singular in **-em**; the accusative plural, in **-es**.

INDECLINABLE

The following nouns of neuter gender are regarded as being indeclinable: Agar-agar, buchu, cajuputi, condurango, cusso, diachylon, gambir, gummi, jaborandi, kino, matico, paracoto, sabal, sassafras, sumbul and tolu.

It will be of further help to the student to know that more than three-fourths of all official names are included in two declensions:

1. The following general classes of preparations have names ending in **-a** in the nominative singular and belong to the first declension:

Alkaloids	Pastes
Masses	Pills
Mixtures	Resins
Oleoresins	Tinctures
	Waters

2. The following have names ending in **-us** in the nominative singular and belong to the second declension:

Syrups	Troches.
--------	----------

3. The following end in **-um** and belong to the second declension:

Acids	Liniments
Decoctions	Metals
Emulsions	Oils, fixed and volatile
Extracts	Ointments
Fluidextracts	Oleates
Fluidglycerates	Plasters
Glycerites	Salts of the halogens
Hydroxides	Serums
Infusions	Vinegars
	Wines

ADJECTIVES

Adjectives agree in number, gender and case with the nouns which they modify. They are declined as are nouns, and belong either to the first and second, or to the third declension.

Adjectives of the first and second declensions end, when masculine, in **-us** or **-er**; when feminine, in **-a**; and when neuter, in **-um**. They are declined like nouns of the corresponding gender having similar endings; the masculine, like *syrupus*; feminine, like *mistura*; and neuter, like *acidum*. Those ending in **-er** change the **-er** to **r** and add the case endings.

Adjectives of the third declension ending in **-is** are masculine or feminine, those in **-e** are neuter. They are declined as follows:

PARADIGM

	<i>Singular</i> <i>Masculine and</i> <i>Feminine</i>	<i>Neuter</i>	<i>Plural</i> <i>Masculine and</i> <i>Feminine</i>	<i>Neuter</i>
<i>Nom.</i>	mit is	mit e	mit es	mit ia
<i>Gen.</i>	mit is	mit is	mit ium	mit ium
<i>Acc.</i>	mit em	mit e	mit es	mit ia
<i>Abl.</i>	mit-i	mit-i	mit-ibus	mit-ibus

Adjectives of the third declension ending in **-ns** are frequent in pharmaceutical Latin. They are present participles of verbs, and they are declined as follows:

PARADIGM

	<i>Singular</i> <i>Masculine and</i> <i>Feminine</i>	<i>Neuter</i>	<i>Plural</i> <i>Masculine and</i> <i>Feminine</i>	<i>Neuter</i>
<i>Nom.</i>	bullien s	bullien s	bullient es	bullient ia
<i>Gen.</i>	bullient is	bullient is	bullient ium	bullient ium
<i>Acc.</i>	bullient-em	bullien-s	bullient es	bullient ia
<i>Abl.</i>	bullient-i	bullient-i	bullient-ibus	bullient ibus

Numeral adjectives belong to the same three declensions as do adjectives in general. But the cardinals above *tres* are indeclinable, except multiples of *centum*. As they are seldom, if ever, used in prescription writing, being expressed always by the Roman or Arabic characters, it is not necessary to discuss them in this place.

The comparison of adjectives also does not, in general, concern us in the writing of prescriptions, and the few instances in which forms other than the positive are used will be learned quite readily as they are encountered.

The comparatives, ending in **-ior** (masculine and feminine) and **-ius** (neuter), are declined as adjectives of the third declension.

PARADIGM

	<i>Singular</i>		<i>Plural</i>	
	<i>Masculine and Feminine</i>	<i>Neuter</i>	<i>Masculine and Feminine</i>	<i>Neuter</i>
<i>Nom.</i>	fortior	fortius	fortior es	fortior-a
<i>Gen.</i>	fortior is	fortior-is	fortior um	fortior-um
<i>Acc.</i>	fortior-em	fortius	fortior es	fortior a
<i>Abl.</i>	fortior e	fortior e	fortior ibus	fortior-ibus

VERBS

Verbs in Latin are conjugated, as are verbs in English, and their conjugations are quite complex. For the purposes in hand the matter of conjugation may be much simplified and reduced to the learning of a few forms only, with their meanings and modes of use in grammatic construction. We may also limit the number of conjugations to be considered to the first three of the regular verbs.

The regular verbs are distinguished as to con-

jugation by the vowel which precedes the **-re** in the ending of the present infinitive of the active voice, thus:

<i>Conjugation</i>	<i>Infinitive Ending</i>	<i>Characteristic Vowel</i>
<i>First</i>	-are	a
<i>Second</i>	-ere	e (long)
<i>Third</i>	-ere	e (short)
<i>Fourth</i>	-ire	i

(The principal parts of a verb are the present indicative, present infinitive, perfect indicative, and the supine or perfect participle. They are called the principal parts because they serve to give the stems from which the full conjugation of the verb can be derived. The present indicative gives the form of the present stem; the present infinitive gives the future and subjunctive stems and indicates the conjugation to which the verb belongs. For medical uses in the writing of prescriptions it is sufficient to know the present stem and the conjugation to which the verb belongs.)

FORMS OF VERBS IN USE

For the purposes of prescription writing practically the only forms of the verbs which are used at present are:

1. The second person, singular number, present tense of the imperative mode in the active voice. It is found by dropping the **-re** of the present infinitive and is identical with the present stem. It is translated as a direct command, thus: *recipe pilulas*, take the pills. The noun is the object of the verb and is to be expressed in the accusative case.

2. The third person, singular or plural, of

the present subjunctive in the active voice. It is characterized by the final **-t** in the singular and final **-nt** in the plural. This is also translated as a command, thus: *mistura colet*, let the mixture strain, or *misturæ colent*, let the mixtures strain. The verb agrees with the noun in number. The noun is the subject of the verb and is therefore expressed in the nominative case. These active forms of the subjunctive are infrequently used, the imperative mode being preferred.

3. The third person, singular or plural, of the present subjunctive in the passive voice. It is characterized by the final **-tur** in the singular and final **-ntur** in the plural. The usage is again that of a command, thus: *tinctura addatur*, let the tincture be added, or *tincturæ addantur*, let the tinctures be added. As in the preceding the noun is the subject and is in the nominative case. The verb agrees with the noun in number.

While the subjunctive forms are characterized by the endings stated, the vowel which precedes these endings differs according to the conjugation of the verb. The complete subjunctive terminations for the forms used are given in the following table for each of the four regular conjugations:

SUBJUNCTIVE ENDINGS

Third person, present tense.

Conjugation	Active voice		Passive voice	
	Singular	Plural	Singular	Plural
1	-et	-ent	-etur	-entur
2	-eat	-eant	-eatur	-eantur
3	-at	-ant	-atur	-antur
4	-iat	-iant	-iatur	-iantur

The third conjugation verb, *capio*, takes the endings of the verbs of the fourth conjugation in the subjunctive modes, both active and passive.

FACIO AND FIO

The verb *facio*, I make, belongs to the third conjugation. It is irregular and has the form **fac** for the second person, singular, present imperative in the active voice.

The verb *fio* is used as the passive voice for *facio* and is translated *be made*. The third person in the present subjunctive is **fiat**, let (it) be made, in the singular number and **fiant**, let (them) be made, in the plural.

SUBJUNCTIVE WITH UT

Ut is used as a conjunction with the subjunctive mode to express purpose, as: *Adde aquam ut solutio fiat*—add water that a solution be made. In this construction it is customary to place the name of the preparation between the word *ut* and the verb.

In the following table the several parts of the verbs most commonly used in the writing of prescriptions are given, showing the forms for each of the three commonly used conjugations. From the table, the corresponding forms of the other verbs which may be used can readily be derived when the conjugation is known.

The following list of verbs will be found to cover most of the needs of the prescriber. The

TABLE OF PRINCIPLE PARTS OF VERBS COMMONLY USED IN PRESCRIPTION WRITING

CONJUGATION	ACTIVE VOICE				PASSIVE VOICE	
	Present Indicative First Person Singular	Present Imperative Second Person Singular	Present Subjunctive		Present Subjunctive Third Person Singular	Third Person Plural
			Third Person Singular	Third Person Plural		
First	Do Pulvero	Da Pulvera	Det Pulveret	Dent Pulverent	Detur Pulveretur	Dentur Pulverentur
Second	Misceo	Misce	Misceat	Misceant	Misceatur	Misceantur
Third	Divido	Divide	Dividat	Dividant	Dividatur	Dividantur

arrangement is according to conjugation, and is alphabetic for each conjugation.

VERBS IN COMMON USE IN PRESCRIPTIONS

First conjugation:

<i>Verb</i>	<i>Meaning</i>
Agito.....	shake
Colo.....	strain
Coloro.....	color
Do.....	give
Filtro.....	filter
Macero.....	macerate, soak, soften by soaking
Pulvero.....	powder, reduce to powder
Sto.....	stand
Trituro.....	triturate, reduce to powder

Second conjugation:

<i>Verb</i>	<i>Meaning</i>
Misceo.....	mix

Third conjugation:

<i>Verb</i>	<i>Meaning</i>
Addo.....	add
Capio.....	take
Divido.....	divide
Extendo.....	spread (with supra = spread upon)
Mitto.....	send
Obduco.....	coat, cover
Pono.....	place, put
Recipio.....	take
Repeto.....	repeat
Solvo.....	dissolve
Sufficio.....	suffice
Tero.....	rub

PREPOSITIONS

Latin has a number of prepositions, and their use is accompanied by a modification of the case

of the nouns which they govern. Prepositions indicate the relation of objects one to another. Only those commonly used in prescriptions will be given.

The following prepositions govern the accusative case:

Ad.....	to, up to
Ante.....	before
In.....	into
Post.....	after
Secundum.....	according to
Supra.....	upon

The following prepositions govern the ablative case:

Cum.....	with
In.....	in, on
Pro.....	according to, for
Sine.....	without

Ana is a preposition meaning *of each*, and it governs the genitive case. It is transferred from the Greek.

CONJUNCTIONS

Practically the only conjunctions which are likely to be of use to the prescriber are: **vel**, meaning *or*; and **et**, meaning *and*. Their construction is the same as in English.

ADVERBS

Adverbs are used so seldom in prescriptions that a special consideration of them is not needed. Such as are used will be readily learned as they are encountered.

WORDS AND PHRASES

Certain words and phrases recur frequently in the writing of prescriptions. These may preserve their original and strict Latin meanings, but in many instances they are used idiomatically, or are translated rather freely in their use in prescriptions. It will be advantageous to present these words and phrases in the form of a table (pp. 36-38), in which their common meanings in prescription usage, as well as their more or less literal meanings, will be given. For the sake of better understanding, some points in the Latin grammar of each will also be included.

ABBREVIATIONS

Accuracy is very important in the writing of prescriptions. The use of abbreviations tends to the development of inaccuracy on the part of the prescriber, and leaves room, in many cases, for errors in interpretation on the part of the pharmacist. Nevertheless, there are certain abbreviations which are so well known that their use is permissible. The following is a list of those in common use. In addition to these both the Pharmacopeia and National Formulary have adopted official abbreviations for all titles. It is not, however, recommended that these be used in place of the full titles.

COMMON ABBREVIATIONS

UNABBREVIATED

ABBREVIATION	FORM	MEANING
āā.....	ana.....	of each.
a.c.....	ante cibum.....	before meals.
ad lib.....	ad libitum.....	freely.
aq.....	aqua.....	water.
aq. bul.....	aqua bulliens.....	boiling water.
aq. dest.....	aqua destillata.....	distilled water.
aq. ferv.....	aqua fervens.....	hot water.
aq. font.....	aqua fontana.....	spring water.
b.i.d.....	bis in die.....	twice a day.
chart.....	chartula.....	a powder.
co., comp....	compositus.....	compound.
dil.....	dilutus.....	dilute.
Ext.....	extractum.....	extract.
F., ft.....	fiat or fiant.....	let it be made, let them be made.
Flect.....	fluidextractum.....	fluidextract.
gtt.....	gutta.....	drop.
M.....	misce.....	mix.
mist.....	mistura.....	mixture.
no.....	numerus.....	number.
pil.....	pilula.....	pill.
p.r.n.....	pro re nata.....	according to necessity.
pulv.....	pulvis.....	powder.
q.s.....	quantum sufficit or sufficiat.....	as much as necessary.
sat.....	saturatus.....	saturated.
ss.....	semisse.....	(and) a half.
S., Sig.....	signa.....	label.
sol.....	solutio.....	solution.
s.o.s.....	si opus sit.....	if necessary.
stat.....	statim.....	at once.
syr.....	syrupus.....	syrup.
Tr.....	tinctura.....	tincture.
t.i.d.....	ter in die.....	three times a day.
ungt.....	unguentum.....	ointment.

TABLE OF COMMON WORDS AND PHRASES

WORD OR PHRASE	COMMON MEANING	LITERAL MEANING	LATIN GRAMMAR
Ad libitum.....	at pleasure, freely.	at pleasure.	ad with the accusative.
Aequalis.....	equal.....	equal.....	adjective.
Aqua bulliens.....	boiling water.	boiling water.	noun, modified by adjective <i>bulliens</i> , present participle of <i>bullio</i> .
Aqua fervens.....	hot water.....	hot water.	similar to the preceding. <i>Fervens</i> , from <i>fervere</i> .
Aqua fontana.....	spring water.....	spring water.	noun with adjective.
Aqua destillata.....	distilled water.....	distilled water.	perfect participle, passive voice of <i>destillo</i> .
Bene.....	well.....	well.....	an adverb.
Bis in die.....	twice daily.	twice in a day.	<i>bis</i> , an adverb meaning twice; <i>in die</i> , in with the ablative (often also written as "bis in dies").
Cacheta.....	cachet.....	cachet.....	noun.
Charta.....	a medicated paper	paper.....	noun; used idiomatically to mean a medicated paper, in contrast to <i>chartula</i> .
Chartula.....	a powder	little paper.	noun; the name of the container is used here to indicate the thing contained. The word powder is used in the sense of a measured dose of a drug in powdered form. Contrast with <i>pulevis</i> .
Cibus.....	a meal.....	food	noun; usually used in a phrase with <i>ante</i> or <i>post</i> and the accusative.
Collyrium.....	eye-wash	liquid eye-salve.....	noun.
Dosis.....	a dose.....	a dose.....	noun.

Gargarisma.....	a gargle.....	noun.
Gutta.....	a drop.....	noun.
Hæustus.....	a draught.....	noun.
Hora.....	hour.....	noun.
Mane.....	morning.....	noun, indeclinable.
Non.....	not.....	adverb.
Non repetatur.....	let it not be repeated.....	non, with the third person singular, present subjunctive passive voice of <i>repeto</i> .
Nox.....	night.....	noun.
Numero.....	number.....	noun, ablative of specification.
Omnis.....	every.....	adjective, used with the ablative to indicate time when, as with <i>nox</i> , <i>mane</i> , <i>hora</i> , etc.
Ovum.....	egg.....	noun.
Pars.....	a part.....	noun.
Pilula.....	pill.....	noun.
Pro re nata.....	according to necessity.....	a phrase; <i>pro</i> , a preposition meaning according to, with the ablative <i>re</i> , from <i>res</i> , meaning circumstance or condition, modified by the adjective <i>nata</i> , which is the ablative of the perfect participle of <i>nascor</i> (I arise).
Pulvis.....	powder.....	noun; refers to the physical state of the substance. Cf. <i>chartula</i> .
Quantum sufficit..	as much as is necessary.....	as much as suffices.
		<i>quantum</i> , an adjective meaning as much (as); <i>sufficit</i> , third person singular, present indicative of the active voice, from <i>sufficio</i> . The phrase is followed by the genitive (partitive).

TABLE OF COMMON WORDS AND PHRASES—(Continued)

WORD OR PHRASE	COMMON MEANING	LITERAL MEANING	LATIN GRAMMAR
Quantum sufficiat as much as may be necessary	as much as may suffice	here the verb is in the subjunctive to express a condition to be fulfilled. Also takes genitive case.	
Quaque hora	every hour	every hour	<i>quaque</i> , from <i>quisque</i> , every (one), in the ablative, with <i>hora</i> , to express time when.
Secundum artem appropriately	according to the art	according to the art	<i>secundum</i> , preposition with the accusative.
Semisse	and a half	and a half	ablative from <i>semis</i> , <i>cum</i> (with) being understood. Used with numerals and abbreviated ss.
Si opus sit	if necessary	if there be need	<i>si</i> , a conjunction meaning if, with <i>opus</i> , a noun, meaning need (in the nominative as the subject of the subjunctive); <i>sit</i> , the third person singular, subjunctive, from <i>sum</i> (I am), meaning be there, or (if) there be.
Statim	at once	at once	adverb of time.
Talis, -e	such	such	adjective.
Tere simul	rub together	rub together	<i>tere</i> , imperative from <i>tero</i> , with the adjective <i>simul</i> , meaning together.
Ter	three times	three times	adverb, usually used in the phrase <i>ter in die</i> three times daily. See <i>bis</i> .
Vitellus	yolk of an egg	yolk	noun.

CHAPTER III

GRAMMATIC CONSTRUCTION OF THE PRESCRIPTION

THE official Latin names of drugs and preparations constitute the major portion of a modern prescription which is written in Latin. It will, therefore, be helpful to precede the discussion of the grammatic construction of the prescription by a few notes upon the general types into which they fall, the methods of naming employed and to state two general rules which bear upon their declension. The general types given below do not include all official preparations, but the small number of exceptions can be readily learned as they are encountered.

Official Latin Titles.—These can be grouped under five general types:

1. A noun with one or more adjectives, all in the nominative case and agreeing in gender and number. Eg.; *Acidum hydrochloricum*, *Acidum Hydrochloricum Dilutum*.

2. A noun modified by another noun. The modifying noun is in the genitive case in accordance with the rule stated below, the noun which is modified is in the nominative. Eg.; *Tinctura Opii*.

3. Similar to No. 2 with an adjective modify-

ing one of the nouns, and agreeing with it in number, gender and case. Eg.; *Tinctura Opii Camphorata*, *Sodii Phosphas Exsiccatus*.

4. Titles containing two nouns connected by the conjunction *et*. The two nouns thus connected are in the same case. Eg.; *Bismuthi et Ammonii Citras*.

5. Titles containing two nouns connected by a preposition. The noun which follows the preposition is governed by it and is therefore expressed in the appropriate case. Eg.; *Hydrargyrum cum Creta*.

Capitalization of Words in Official Titles.

Capitals are used throughout all official titles for all of the important words. Prepositions and conjunctions are practically the only words not capitalized. In writing prescriptions the official method of capitalization should be preserved.

Order of Words in Official Titles.

1. In the case of official acids the word *acidum* precedes the name of the acid. Eg.; *Acidum Boricum*.

2. In the case of official salts the name of the base precedes that of the acid, and is expressed in the genitive case. Eg.; *Sodii Chloridum*.

3. In galenical preparations the name of the preparation precedes that of the drug, or drugs, from which it is made. Eg.; *Extractum Ergotæ*.

4. In titles containing a noun modified by an adjective the noun precedes the adjective. Eg.; *Cinchona Rubra*, *Sodii Arsenas Exsiccatus*, *Pulvis Rhei Compositus*.

Rules.—

1. *In compound names, in which one noun qualifies another, the qualifying noun is expressed in the genitive case.* Eg.; *Tinctura Nucis Vomicae*; where the name of the preparation, *tinctura*, is qualified by the name of the drug: *nux vomica*.

2. *In declining compound names, like those of the official titles, only those words which are in the nominative case are declined.* All others retain the original case throughout.

The prescription has been defined, its several parts mentioned, and the rudiments of Latin grammar discussed, so that we are now in a position to enter in some detail into a consideration of the grammatic construction of the prescription.

The superscription and the inscription together form a sentence which is a command. The verb is expressed but once, and is understood as referring to each of the several objects specified in the inscription, thus:

R. Acetanilidi.....grana tria
Sodii Bicarbonatis.....grana decem

Which is to be translated, “take (thou) three grains of acetanilid; take (thou) ten grains of sodium bicarbonate,” or the conjunction *and* may be understood, thus: “take three grains of acetanilid and ten grains of sodium bicarbonate.

1. The Superscription.—The word *recipe* is the second person, singular number, present tense, of the imperative mode of the verb *recipio* (I take). This is common to all prescriptions.

2. The Inscription. This is peculiar to the individual prescription, but its general characters are common to the greater number of all prescriptions. It contains the object, or objects, of the command, "take." In the majority of prescriptions this object is the *unit of measure* of the drug (or drugs) which is to be taken; *e.g.*, grain, ounce, gram, etc. This is to be expressed in the accusative case, being the object of an active transitive verb. In practice, however, the unit is not written out, but is expressed by the appropriate symbol or abbreviation.

As adjectives agree with their nouns in number, gender, and case, the numerical adjectives which modify the units of measure are also expressed in the accusative case; *e.g.*, *unciam unam*, *grana tria*, etc. Here again the word is seldom, if ever, written out, the adjective being expressed by the appropriate Roman or Arabic numerals.

The official Latin name of the drug, or preparation, of which the amount specified is to be taken, is expressed in the genitive case. The use of the genitive for the name of the drug or its preparation is the general one, and applies to all cases in which the quantity is specified by weight or measure. Such use of the genitive is termed the *partitive genitive*, as it indicates the substance of which a part is to be taken.

The modifying adjectives which are used in the official names of drugs are to be expressed in the genitive case, agreeing also with their nouns in number and gender, *e.g.*,

R̄. Pulveris Morphinae Compositi. gr. v

When a preparation of a drug is employed, *e.g.*, the tincture, the extract, etc., the name of the drug is already expressed in the genitive; for example, *tinctura nucis vomicae*. In such cases the unit of measure refers to the preparation, and not directly to the drug; hence the name of the preparation (in the example -*tinctura*) is to be expressed in the genitive, as explained above.

The superscription and inscription may be analyzed thus:

Imperative verb.	R̄(ecipe)	Accusative case
Partitive genitive	{	Codeinæ. gr. i. granum unum
		Acidī Phosphorici
		Diluti. ℥ x. minima decem
		Syrupi Sarsaparillæ Compositi ℥ i. . drachmam unam

An *exception* to the use of the genitive case when expressing the ingredients of the prescription occurs in those instances in which *the name of a preparation is made the direct object of the verb "take,"* the name of the preparation being then expressed in the *accusative* case. Under these conditions the quantity is expressed as a numerical adjective modifying the name of the preparation, *e.g.*:

R̄. Pilulas Ferri Compositas. ij (duas)

which is translated, "take two compound pills of iron." (*Ferri* remains in the genitive, in accordance with the rule covering the declension of compound names.)

3. The Subscription.—This is a sentence apart from the one made up of the first two por-

tions of the prescription. It is written in Latin, as previously stated, and should be expressed in the *simplest manner possible*. It comprises the directions to the pharmacist, and details of pharmaceutical procedure should, as a rule, be left to his discretion. In the present day of simplicity in prescriptions perhaps the readiest method of presenting the construction of the subscription is by means of a series of models which will cover most of the commoner needs. The grammar of each of these will be briefly discussed—just sufficiently for a clear and intelligent understanding of its use. These types may be modified to suit individual needs, but for the average the models given will probably be sufficient.

SUBSCRIPTION TYPES

1. Misce (imperative)—meaning “mix”—may be used alone in the case of a prescription the ingredients of which, when mixed, will make a solution or simple mixture, as in the case of dry powders. Where such is not the case, it is customary to state the nature of the preparation which is to result from the mixture of the ingredients. In all prescriptions, be they fluid, semisolid, or solid, in which there are two or more ingredients, this word or its abbreviation (M.) should precede any other orders which may be given in the subscription. Exceptions to this generalization are to be found in the cases of prescriptions which call for the making of such preparations as decoctions, infusions, and the like. .

2. Misce et fiat solutio "mix and let a solution be made." This form of subscription may be used if one desires to call attention to the fact that he wishes the apothecary to prepare a solution. Some use it for any prescription which, when compounded, will make a solution. Others reserve its use for those cases in which an indefinite amount of solvent is ordered, or where no special solvent has been indicated, and the pharmacist is permitted to use his discretion as to quantity or type of solvent, or both. When another type of preparation, such as an emulsion, mixture, etc., is directed, its name may be used instead of the word *solutio* without changing the construction. This should be done in every case in which a preparation other than a simple solution is desired. The following example illustrates the reason for this: A physician may order slightly more of a solid drug than will completely dissolve in the solvent prescribed. If he is unaware of this fact and has directed the pharmacist to make a solution, the pharmacist may add some other solvent in just sufficient amount to complete the solution, or he may consult the physician before compounding the prescription and call his attention to the error. If, on the other hand, the prescription had specified a mixture, it would then have been evident that the prescriber had known the insolubility and had, nevertheless, desired the proportions specified.

Misce et fiat—"mix and let be made." *Et* is a conjunction meaning *and*; *fiat* is the third

person singular, present subjunctive. The name of the preparation is the subject of the subjunctive verb, and therefore is to be expressed in the nominative case. *Fiat* is used only when the name of the preparation is in the singular number. In the case of pills, powders, etc., where the name of the preparation is expressed in the plural, the third person plural of the verb is to be used, the form being *fiant*.

The expression *misce et fiat* (or *fiant*) is adaptable to the majority of the prescriptions which are written at the present time.

3. Fiat Decoctum.—This subscription may be used in the case of decoctions or, if the word *infusum* be substituted, in the case of infusions. As the U.S.P. gives directions for the manufacture of these preparations, it is unnecessary for the prescriber to direct the details of their preparation. The word *misce* is omitted from this form of subscription because the process is a special one and not one of simple admixture. The construction is grammatically similar to that discussed under caption 2.

4. Misce et Divide in.—This form may be used in the case of pills, powders, troches, etc., that is, where the prescription is to be divided into parts or doses and dispensed in such form. The name of the form in which the prescription is to be dispensed (pills, powders, etc.) is then to be expressed in the accusative case after the preposition *in*, meaning *into*. The construction of *divide* is the same as that of *misce* and has already been explained.

5. **Pone**, meaning "put" or "place," may be substituted for *divide* in the preceding form. It is used in such prescriptions as call for the use of capsules, cachets, etc., that is, whenever the ingredients are to be put into containers in which they are to be taken. *Pone* may be used in the case of a single drug, the word *misce* then being omitted. *Fiat* and *fiant* are sometimes used when the prescription is to be dispensed in the form of one or more capsules, cachets, etc., but the use of *pone* is to be preferred.

6. **Tere** means "rub," and is used in such prescriptions as require the mixture of their ingredients by rubbing, as in the making of ointments, pastes, etc. It may be combined with other orders, such as, **misce et tere bene**, "mix and rub or stir well," etc. In prescriptions containing several ingredients the adverb **simul** ("together") may be used with *tere*, e.g., **tere simul et fiat pasta**, "rub together and make a paste." *Tere* is the imperative from *tero* ("I rub, stir, mix by rubbing"); its construction is similar to that of *misce*.

7. **Tritura**, meaning triturate, is used when the mixture is more specifically in the nature of a trituration; as, **tritura et fiant tabellæ**, "triturate and make tablets." It is also used where dry solids are to be powdered. It is the imperative from *trituro* ("reduce to a powder").

8. **Fac** ("make") corresponds in construction to *misce*, that is, it is the imperative. Instead of writing *fiant pilulæ*, one may write **fac pilulas**.

The name of the preparation which is to be made is the object of the verb and is to be expressed in the accusative case.

9. **Fac talem** or **-e, tales** or **-ia** means "make such." This construction is used in prescriptions in which the quantities stated for the several ingredients are the amounts required for a *single dose* of the specified size. It is followed by the name of the dose, as pill, powder, etc., or merely by the word for dose (*dosis*), the accusative case being used. If the total prescription calls for only one dose, one might write **fac talem dosem**; this is, however, unusual, as a number of doses is generally specified, thus: **Fac tales doses xx**, "make twenty such doses." The word **ad** is omitted, the numeral adjective directly modifying the noun.

10. **Numero** in prescriptions is written in the ablative (nominative, *numerus*), the construction being termed the *ablative of specification*. It is to be translated literally—"to the number of," and is usually abbreviated to **No.**

CHAPTER IV

WEIGHTS AND MEASURES

Two distinct systems of weights and measures are in use at present—the apothecaries' and the metric systems. The former is the older, and is still in fairly general use among physicians and pharmacists. This is due to the fact that the older physicians were not made thoroughly conversant with the metric system, and to the continued use in text-books of the apothecaries' system in the expression of doses. Its use has been propagated further by the fact that the Government has merely legalized the metric system and has not made its use compulsory. In spite of these factors acting to foster the continuance of the apothecaries' and to retard the adoption of the metric system, the latter is growing in popularity and will eventually supplant the former. Among the more important advantages possessed by the metric system may be mentioned the following: (1) It is the legal system of the majority of civilized nations; (2) it is the system used in science the world over; (3) it is the same in all countries; (4) the terms of weight and measure are based upon a common unit, the meter; (5) its nomenclature is self-explanatory; (6) it is a decimal system.

In addition to the advantages just mentioned,

the physician of the present must be familiar with the metric system, because it is supplanting the apothecaries' system; because it has been adopted for the Pharmacopeia and the National Formulary, and the doses are there given in metric units; because the doses of many of the newer remedies are expressed in its terms; because it is the only system in use in Continental medical literature; and because it is in general use in British and American scientific medical writing. Further, its use in prescription writing is very simple, as here it is customary to express all weights and measures in the terms of a single unit and its decimal fractions, the gram or cubic centimeter being that unit. Strictly, the gram and cubic centimeter are identical in the case of distilled water only, and at a certain temperature.

For its most successful utilization one should become thoroughly familiar, by sight and touch, with the actual size and weight of such common weights as a milligram, gram, and kilogram, and such fluid measures as the cubic centimeter and the liter. (For fluids, no smaller unit of measure than the cubic centimeter is in common use.)

It is possible, though not wholly satisfactory, to gain a considerable degree of familiarity with the metric system by means of a thorough acquaintance with certain of the relations which exist between it and the more generally known apothecaries' system, and by facility in the application of certain rules for interconversion between the two systems. These relations will be

shown in the form of a table, and the rules will be given in the following pages.

For a more detailed discussion of the two systems the reader is referred to the appropriate works on the subject. The following is intended to cover the needs of prescription writing only.

THE APOTHECARIES' SYSTEM

This is based upon the Troy system of weights and the wine measure.

TABLE OF APOTHECARIES' WEIGHTS

		GRAIN	<i>Symbol</i> gr.
20 grains	=	1 scruple	℥
60 " "	=	1 DRAM	ʒ
8 drams	=	1 OUNCE	℥
12 ounces	=	1 pound	lb. (libra)

The grain, dram, and ounce are the most common units in prescription writing. The scruple is no longer used, partly, at least, owing to the likelihood of its symbol being confused with that for the dram when hastily written. The grain is the smallest unit, and its subdivisions are expressed as common fractions. The dram contains 60 grains, and is one-eighth of an ounce. The ounce contains 8 drams, or 480 grains. The pound is never used in the prescription, but it should be known for comparison with the kilo of the metric system.

The unit, or its symbol, or abbreviation, is commonly written first in the apothecaries' system, and is *followed by the numeral*, which is to be expressed in the *Roman characters*, thus:

twenty grains = gr. xx, etc. In the case of the use of fractions of a grain the abbreviation of the unit again precedes, but here the numeral is to be expressed in the Arabic notation in the form of a simple fraction; thus one-sixtieth of a grain would be written gr. $\frac{1}{60}$, etc. An exception to the use of the common fraction occurs in the case of the *half*, which is commonly expressed by the abbreviation ss., which stands for (*cum*) *semisse*, meaning, "and a half"; thus half a grain would be written gr. ss.; two and a half grains, gr. iiss, etc.

TABLE OF APOTHECARIES' FLUID MEASURES

			<i>Symbol</i>
		MINIM	℥
60 MINIMS	=	1 DRAM	℥
8 DRAMS	=	1 OUNCE	℥
16 OUNCES	=	1 pint	O (octarius)

It will be seen at once that this table is closely similar to the one of weights—the grain and minim correspond, the dram and fluidram, and the ounce and fluidounce, agree one with the other. The pint (water), weighs approximately one pound Avoirdupois, but as there are 16 ounces in the pint, the fluid ounce, fluid dram, and minim weigh less than the corresponding units of weight. Since we do not weigh fluids in the apothecaries' system, it is unnecessary to consider these differences more in detail. For the purposes of calculation in the average prescription it is necessary to use but a single group of figures which are common to both solids and fluids; that is, for both weight and measure, as

there are as many minims in the fluidram and fluidounce respectively as there are grains in the dram or ounce, and as the number of fluidrams in the fluidounce is the same as that of drams in the weighed ounce.

In the case of the fluid measure the dram and ounce are often distinguished from their corresponding terms of weight by the prefixing of the letter **f** to the symbol. This is hardly necessary, for it is understood that when a fluid is indicated it is to be measured, while a solid is to be weighed.

The system of notation is similar to that discussed under the subject of weights, except that one seldom calls for the measuring of fractions of a minim other than a half.

In the use of the Roman numerals it is customary to draw a line above the cardinals and to place a dot over each "i," to prevent error, for two "i's," if hastily written, may be almost run together at the bottom and are likely to be read as a "v," etc. If they are dotted, such an error becomes practically impossible. When final the "i" is usually written "j," as viij.

THE METRIC SYSTEM

This is now the **official** system of weight and measure. It takes its name from its unit, the **meter**, which is the ten-millionth part of the quadrant of the earth's circumference measured from the pole to the equator. The meter is the basic unit from which all terms of weight and measure are derived.

In prescription writing the **gram** and the **cubic**

centimeter respectively are commonly employed as the units of weight and measure, either as such, or in the form of their multiples or decimal fractions.

The **gram** is the unit of weight, and is the weight of one cubic centimeter of distilled water at its maximum density, that is, at the temperature of 4°C.

The **cubic centimeter** is the capacity of a cube each side of which measures one centimeter. One cubic centimeter of any fluid having approximately the same specific gravity as water is considered, for convenience, as weighing one gram.

In the metric system certain prefixes are used in conjunction with the units to indicate multiples or decimal fractions thereof.

PREFIXES FOR MULTIPLICATION OF THE UNITS

deca-	= ten	multiplies the unit to which prefixed by ten
hecto-	= hundred	multiplies the unit to which prefixed by one hundred
KILO	= THOUSAND	multiplies the unit to which prefixed by ONE THOUSAND

PREFIXES FOR DIVISION OF THE UNITS

deci-	= ten	divides the unit to which prefixed by ten
CENTI-	= HUNDRED	divides the unit to which prefixed by ONE HUNDRED
MILLI-	= THOUSAND	divides the unit to which prefixed by ONE THOUSAND

The prefixes used for multiplication are derived from the Greek, while those for division are Latin. Thus a milligram would be $\frac{1}{1000}$ gram,

usually written in the decimal fraction—0.001 Gm.; a kilogram would be 1000 grams. Certain of these prefixes are not very commonly used in practice; thus, *deca-* and *hecto-*, which are given in small type in the table, are seldom used in medicine; *deci-* is used rather more frequently, but still is not of very common occurrence. Usage will be discussed further after the tables of weights and measures have been given.

Only such tables will be given as are of use in prescription writing; a more detailed discussion must be sought elsewhere. The orthography used is that recommended by the Boston Metric Bureau, and is that in general use in the United States.

TABLE OF METRIC WEIGHTS

GRAM	= weight of one cubic centimeter of water at 4°C.	Gm. = 1.0
decigram	= one-tenth of a gram	degm. = 0.1
CENTIGRAM	= one-hundredth of a gram	cgm. = 0.01
MILLIGRAM	= one-thousandth of a gram	mgm. = 0.001

In common practice the decigram is seldom used, the centigram more frequently, and the gram and milligram are the usual forms. Thus, it is customary to speak of 0.125 Gm. as 125 milligrams, rather than one and one-quarter decigrams, or twelve and one-half centigrams; 0.05 Gm. might be spoken of as either 50 milligrams or as 5 centigrams, but almost never as half a decigram.

TABLE OF METRIC FLUID MEASURES

MILLILITER, CUBIC CENTIMETER	mil, c.c. = 1.0
Deciliter	dl. = 100.0 c.c.
LITER	L. = 1000.0 c.c.

In the present revisions of the U. S. P. and N. F. the term *mil* is used to replace that of c.c., being the abbreviation of milliliter. While there is a minute difference between the size of the mil and that of the c.c., this is too slight to be of any importance and the two may be regarded as identical. The term *mil* has not yet come into general use and we will continue to speak of c.c. as the better known term.

The cubic centimeter and the liter are the two of these terms which are in common use, and of these the cubic centimeter, or mil, is the measure which is used in prescription writing.

In European countries it is the custom to weigh both solids and fluids, and such a procedure introduces a complication in the use of the metric system, owing to the differences in specific gravity of some of the very light or very heavy fluids. The complication arises in estimating the bulk of a prescription containing one of these fluids, for the dose which the patient takes is ordinarily measured there as well as here, and differences in the total bulk of the prescription from the average reduce the number of doses, or increase them, in some cases so greatly as to affect materially the amount of the contained ingredients in each dose of the resulting prescription. Thus, if a prescription called for 30 doses of a teaspoonful each (5 c.c.), the total bulk would have to be 150 c.c.; if glycerin was a considerable constituent, one would have to take into consideration the fact that one cubic centimeter of it weighs considerably more than one

gram, hence the number of grams which would have to be added to the prescription to give the proper bulk would be much more than of a corresponding bulk of a fluid of the same weight as water. It is not necessary, however, to discuss these factors of specific gravity further in this place, for in English-speaking countries the custom of measuring fluids, instead of weighing them, has been preserved in the metric system. The use of fluid measures also extends to the expression of doses in the U.S.P. and N.F. On the whole, this is the preferable method as far as prescriptions are concerned, for, as mentioned above, the patient will measure his dose of a fluid medicine and not weigh it.

It is well to remember, however, that the gram and cubic centimeter (mil) are practically interchangeable except in the case of the preparations, such as ether, which are much lighter than water, or glycerin, etc., which are much heavier than water.

In the United States, then, a metric prescription calling for both solid and fluid ingredients may be written thus:

R.	Sodii Bromidi.....	3.0
	Chlorali Hydrati.....	1.0
	Syrupi Acaciæ.....	q.s. ad 120.0
	Misce.	
	Sig.—One teaspoonful every four hours.	

It will be observed that no mention of the units of weight or measure is made in the prescription. They are omitted because it is generally understood that the solids will be weighed and the

fluids will be measured. As the gram and cubic centimeter are the only units in use in prescription writing, it is understood that these are the units to which the numerals in the prescription refer. However, for additional clarity many write *Gm. vel c.c.* above the column of numerals. In the arrangement of the column of numerals one should be careful to *place the decimal points one above the other*, in order to avoid error in the reading of the quantities. If one is going to make use of the metric system in the majority, or all, of his prescriptions, it is well to have prescription blanks printed with a vertical line to replace the decimal points, thus:

	<i>Gm. vel c.c.</i>
R. Potassii Citratis	4.5
Infusi Buchu	q.s. ad 120 0

Under such circumstances the cipher before or after the decimal line is usually omitted, but where the decimal point is employed the cipher should always be used to avoid error in reading the location of the point.

The calculation of the amount of a drug which is to be added to a prescription to make each dose contain the desired quantity is very easy in the metric system, consisting of simple multiplication with the expression of the result in whole numbers and decimal fractions of a common unit. There being only one unit in common use in prescription writing for weight and one for measure, and these being practically interchangeable, no reduction to a larger or smaller suitable unit

is necessary, as is the case in the apothecaries' system.

As most of the practising physicians of the present day, some teachers, and not a few text-books still retain the apothecaries' system for the expression of doses, many are not yet familiar with the doses of drugs in any other terms, and many of those who are students now will probably grow more familiar with the expression of doses in the older system through the writings and teaching of their predecessors. This being the case, it becomes important to have an idea of the relations existing between the two systems. These relations are given in two tables, showing the nearly exact and the approximate equivalents.

TABLE OF EQUIVALENTS, WEIGHT

<i>Apothecaries'</i>		<i>Metric, Nearly Exact</i>	<i>Metric, Approximate</i>
One grain	=	0.065 Gm.	0.06 Gm.
One dram	=	3.88 Gm.	4.00 Gm.
One ounce	=	31.10 Gm.	30.00 Gm.

TABLE OF EQUIVALENTS, FLUID MEASURE

<i>Apothecaries'</i>		<i>Metric, Nearly Exact</i>	<i>Metric, Approximate</i>
One minim	=	0.061 c.c.	0.06 c.c.
One fluidram	=	3.69 c.c.	4.00 c.c.
One fluidounce	=	29.57 c.c.	30.00 c.c.
One pint	=	473.12 c.c.	500.00 c.c.

To facilitate the grasping of the relations they may also be presented as follows:

TABLE

<i>Metric</i>		<i>Nearly Exact</i>	<i>Apothecaries' Approximate</i>
0.001 Gm.	=	gr. $\frac{1}{65}$	gr. $\frac{1}{60}$
1.0 Gm.	=	gr. 15.43	gr. 15
1.0 c.c. (mil)	=	℥ 16.23	℥ 15

It is not necessary to use the exact equivalents, except in those instances in which a very toxic drug is being prescribed and where the number of doses in the prescription is such that the multiplication of a small error would materially affect the amount actually given. In ordinary practice the approximate equivalents are close enough, for an error of 10 per cent. in dose is generally permissible in therapeutics.

To simplify the conversion from the terms of one system into those of the other, three rules have been formulated and are given in the Fourth Annual Report of the Surgeon General of the United States, 1887. In a somewhat modified form they are:

TO CONVERT FROM THE APOTHECARIES' SYSTEM INTO THE METRIC

When the quantity is expressed in terms of the apothecaries' system:

1. *Reduce the quantity to grains or minims and divide by 15; the result will be the equivalent number of grams or c.c.*
2. *Reduce the quantity to drams and multiply by 4; the result will be the equivalent number of grams or c.c.*
3. *Reduce the quantity to ounces and multiply by 31; the result will be the equivalent number of grams or c.c.*

Though these rules apply only to conversion from the apothecaries' system to the metric, it is obvious that, by simple reversal of the process in

each case, they are equally applicable to conversion from the metric into the apothecaries' system. Thus, to convert grams to drams one need only divide the number of grams by 4. It must be borne in mind that as there are three common units in the apothecaries' system, conversion from the metric may yield fractions of the unit desired, and the result must, therefore, be reduced to terms of the most appropriate unit after conversion.

HOUSEHOLD MEASURES

While the physician and the pharmacist can deal in terms of uniform and standard weights and measures, the patient generally resorts to the use of one of the household utensils as the means of measuring the doses he must take. These household measures are not of uniform size. It would be far better, therefore, if the physician would advise his patients to provide themselves with the inexpensive and fairly accurate medicine glasses and minim droppers which are to be found in any pharmacy. No mention is made here of the measuring of solid prescriptions, for these are usually ordered dispensed already subdivided into some convenient form of dose, such as the pill, capsule, powder, etc.

While the use of the minim dropper and medicine glass is gaining in popularity, the use of the household measure is still the custom; hence a brief table showing the equivalents of these measures is desirable. As these measures are not uniform in size, it is not possible to give more than the approximate equivalents of each.

TABLE OF HOUSEHOLD MEASURES WITH APPROXIMATE EQUIVALENTS

<i>Household Measure</i>		<i>Apothecaries'</i>	<i>Metric</i>
Teaspoon	=	One dram	4.0 c.c.*
Dessertspoon	=	Two drams	8.0 c.c.
Tablespoon	=	Half-ounce	15.0 c.c.
Wineglass	=	Two ounces	60.0 c.c.
Glass	=	Eight ounces	250.0 c.c.

THE "STANDARD" PRESCRIPTION

Many who originally learned the doses of drugs in terms of the apothecaries' system are desirous of employing the metric system in the writing of their prescriptions. For the sake of added facility in the conversion from the apothecaries' into the metric system the use of the so-called standard prescription has been advocated. This prescription is one which contains 15 doses. The method of conversion from the apothecaries' system to the metric would be to multiply the number of grains or minims required in the single dose by the total number of doses in the prescription, and then to reduce this number of grains or minims to grams or cubic centimeters by division by 15, the number of grains in one gram, or minims in one cubic centimeter. As the "standard" prescription contains 15 doses, the multiplication of the single dose by the number of doses in the prescription exactly neutralizes the subsequent division by 15 to convert to the metric system. It is, therefore, unnecessary to go through the several steps of multiplication, for one has merely to express,

* It is said that in reality the average teaspoon of the present time holds more nearly 5 c.c., or a little over one dram.

in terms of grams or cubic centimeters in the finished prescription, the number of grains or minims desired for each single dose of the size specified. The use of the standard prescription might be stated in the form of a rule as follows: Knowing the dose in terms of grains or minims, and desiring to prescribe in terms of the metric system, *make the prescription contain 15 doses and, for the finished prescription, use the same number of grams or cubic centimeters as it is desired to have of grains or minims in each dose.*

Example: It is desired to give 10 grains of sodium salicylate in each teaspoonful dose; therefore the following might be written:

R. Sodii Salicylatis..... 10.0
 Aquæ Menthæ Viridisq. s., ad 60.0
 M. et Sig.—One (1) teaspoonful after each meal.

This example would provide a prescription which would last for only five days; if it were desired to have it last for more than a week, it would be simple to double the entire prescription. The use of the "standard prescription" is applicable only to such prescriptions as contain 15 doses or some multiple of this number.

The application of the "standard prescription" is simple, but it is a short cut and is not very accurate. It is not advised for the student because it deprives him of all of that practice in the conversion from the apothecaries' system into the metric, which is so valuable in familiarizing him with the relations existing between the two.

In addition to this method of ready calculation

the method mentioned on p. 72 may be employed, as suggested there.

Those who have learned the doses of drugs in the apothecaries' system may, by a slight effort, become equally familiar with them in terms of the metric system if they will but group the drugs into classes, scaled according to the metric dose. The practice of learning the metric dose of each drug when it is used in the writing of a prescription will help the practitioner to become familiar with doses in this system. It is true that it will take some effort and consume some time, but it will more than repay the expenditure of both in the end

CHAPTER V

THE PRACTICAL WRITING OF PRESCRIPTIONS

THE so-called typical prescription has four distinct portions in the inscription. These are known as the **basis**, the **adjuvant**, the **corrective**, and the **vehicle**, or **excipient**. The following example will illustrate these:

1....℞. Aloini.....gr. ss
2.... Extracti Nucis Vomicae.....gr. $\frac{1}{8}$
3.... Extracti Belladonnae Foliorum.....gr. $\frac{1}{6}$
4.... Extracti Gentianæq. s. ad gr. ij
Misce et fiant tales pilulae numero xx.

Sig.—Take one or two (1 or 2) at bedtime, as required.

MR. SMITH.

J. MEDICUS, M.D.,
January 1, 1913.

1. Aloin is the **basis**—that is, it is the drug from which the prescription is to derive its chief action.

2. Extract of nux vomica is the **adjuvant**. It is given to aid and increase the action of the basis, aloin.

3. Extract of belladonna leaves is the **corrective**. It is used to correct and overcome the undesired actions of the basis, or of the basis and adjuvant combined.

4. Extract of gentian is the **excipient**, and it has no action of note in the prescription. It is ordered merely to provide the necessary bulk and to facilitate the combination of the ac-

tive ingredients into a pill of suitable size and consistence.

At the present time the majority of prescriptions differ more or less widely from this typical form. Nevertheless, the type serves to indicate the proper order for the constituents in those prescriptions in which two or more ingredients are used. Thus, the chief ingredient is always to be placed first; if there is more than one active ingredient, these should precede the remaining minor ones. The vehicle or excipient, together with any additional solvents or diluents, should close the inscription. Other constituents, if present, should fill in between these two groups.

THE CONSTRUCTION OF A PRESCRIPTION

The construction of any prescription should proceed in the following manner:

1. After the sign *Rx*, write the official, or Latin, names of the several ingredients desired, being careful to use the proper cases, and following the general order just described.

2. Write the subscription, as this contains one of the factors determining the bulk of the entire prescription.

3. Write the directions to the patient, as these give the size of the single dose which is to be taken, and the number of such doses for a day or other given period of time.

4. Complete with the name of the patient, the prescriber's signature, and the date.

5. Calculate the amount of each of the several constituents which must be used in the total

prescription to make each single dose contain the amount which it is desired to have the patient receive at each administration. Write this quantity after each of the ingredients.

It is advisable, when the prescription has been completed, to read it and to verify the calculations throughout.

The **amount** of each ingredient which is to be contained **in a single dose** must be determined by the physician, according to the conditions to be met and the end desired.

The **size of the single dose** of the completed prescription is to be determined by a consideration of the combined bulk of the several ingredients in one dose; by the degree of solubility of the ingredients in the vehicle, if the prescription is fluid; by the bulk of the single dose in the case of solid prescriptions; and by any other factors which may affect the suitability for administration.

The **total bulk** or **volume** of the prescription will depend upon a combination of the size of the single dose and the number of such doses which the prescriber desires to have dispensed at one time. Factors of deterioration, duration of the course of treatment, expense, liability to alteration in the plan of treatment, and the like enter to influence the total bulk of any prescription, and are, in great part, matters of experience and circumstance. The sizes of the standard bottles in common use must also be considered in the case of liquid preparations, for it is desirable to have the prescription approximately fill the

bottle in which it is to be dispensed. The usual sizes of bottles are: half ounce, one, two, four, eight, twelve, and sixteen ounce, which are approximately equivalent to: 15, 30, 60, 125, 200, 250, 375, and 450 cubic centimeters (mils) respectively.

In general, it is best to make prescriptions small rather than large, for when they are small, it is possible to repeat them if need be, while if they are too large, the patient will have been put to unnecessary expense.

To determine the total quantity of a prescription which is to be ordered one should *multiply the number of doses which are to be taken in each twenty-four hours by the number of days over which the administration is to be continued*. Then express the result in terms of the appropriate unit of measure. It is customary, then, to adjust the resulting quantity so as to fill a bottle of the nearest standard size in the case of fluid preparations. By way of illustration: It is desired to give four teaspoonful doses a day, over a period of about a week; multiply 4 by 7—the number of days; as a teaspoonful is approximately one dram, the resulting quantity will be roughly 28 drams, which is the total amount required. To allow for loss, variation in the size of teaspoons, and to fill the nearest standard bottle, this quantity should be increased to 32 drams, or 4 ounces. Therefore the prescription will be made to contain 32 doses of a teaspoonful each, and this is the factor by which the single dose of each ingredient is to be multiplied. The

same method applies to metric prescriptions, save that as there is but one unit of fluid measure it is not necessary to reduce to terms of the nearest convenient unit.

CALCULATION OF THE AMOUNT OF EACH INGREDIENT

The prescription is to be written as directed under the head of construction of the prescription, and the total number of doses in the prescription is to be determined by the method just outlined. The amount of each of the ingredients which is to be contained in each single dose must be determined by the physician according to the needs of the case. To determine how much of each ingredient it will be necessary to order for the total prescription, so that each single dose shall contain the desired amount, one may employ one of the following methods:

BY MULTIPLICATION AND REDUCTION TO AP- PROPRIATE UNITS OF MEASURE

The total amount of each ingredient which must be ordered for the completed prescription, so that each dose shall contain the desired amount, is determined by multiplying the amount of the single dose in each case by the number of doses to be dispensed. That is: *Determine the single dose of the ingredient and multiply this by the total number of doses in the prescription*—thus: A prescription contains 30

doses, and it is desired to have each dose contain 10 grains of a drug; the entire prescription must then contain 30 times 10 grains, or 300 grains. In the apothecaries' system it is customary to express the amounts in the terms of the nearest convenient unit of measure. In the example just given one would reduce the 300 grains to terms of drams by dividing by 60, the number of grains in one dram. When the quantity cannot be reduced to a whole number of drams or ounces, as the case may be, there are three possible ways of meeting the difficulty:

(a) Either omit the fraction, if small, or, if it is large, add enough to raise the quantity to the next higher whole number of units. Thus: 4 drams and 10 grains would be reduced to 4 drams; 4 drams and 40 grains would be reduced to $4\frac{1}{2}$ drams, or raised to 5 drams. This method is to be employed only in those cases in which the drug is neither very active nor very poisonous, or where the dose prescribed is such that minor additions or subtractions would not be dangerous.

(b) The quantity may be expressed in terms of the next lower unit. Thus: 2 ounces and 90 grains would become $17\frac{1}{2}$ drams.

(c) Or, lastly, express in terms of the lowest unit of measure—grains or minims. Thus: 3 drams and 14 grains would be written 194 grains.

A fourth method is sometimes used. It is to express in the terms of two or more units. Thus: The last amount given above would simply be expressed as 3 drams and 14 grains. This

method is not in general use, and is not advised, as it is clumsy. The second method of calculation is by the use of the following—

FORMULA

Divide 60 (the number of grains in one dram) by the number of doses in the prescription; then divide the desired dose by the number thus obtained: the result will represent the number of drams to be used.

Explanation.—For the general purposes of prescription writing a 2-ounce mixture may be considered as containing 15 doses of a teaspoonful each; a 4-ounce mixture, 30 doses, etc.

In a 2-ounce mixture each teaspoonful dose will, therefore, contain one-fifteenth of the total amount of each of the constituents in the prescription. Taking the dram (60 grains) as the unit, if one dram of a drug is added to a two-ounce mixture, each teaspoonful dose will contain one-fifteenth of a dram, or 4 grains. If, then, we merely divide the single dose, 4 grains, by this number, 4, as a unit, and express the result in the terms of drams, this will be the amount which must be added to the prescription to give the desired quantity of the drug in each single dose.

To illustrate:

℞. Tincturæ Opii Camphoratæ (dose, 15 minims)
 Phenylis Salicylatis..... (dose, 5 grains)
 Misturæ Cretæ...q. s. ad four ounces.
 Misce et Sig.—One (1) teaspoonful as directed.

This prescription contains 30 doses of the specified size, one dram each.

Divide 60 (grains in one dram) by 30 (the number of doses) = 2.

Divide 15 (the desired dose of camphorated tincture of opium) by this unit, 2, = $7\frac{1}{2}$; express in terms of drams.

Repeat this process with the dose of phenyl salicylate, the dividing unit remaining unchanged.

In the case of drugs the maximum dose of which is less than one grain, the unit of measure is the grain instead of the dram. Therefore 1 is to be used in place of 60, as in the preceding example.

The same formula may be applied to the metric system in those cases in which the doses of the ingredients are known in the apothecaries' system, and it is desired to write the prescription in the metric units. In this case 15 (the number of grains in one gram, or minims in a cubic centimeter) replaces the 60 of the preceding formula, and the result is expressed in terms of grams or cubic centimeters.

Finally, the simplest and quickest method may be stated as follows:

Where the dose of the prescription is one dram the amount of each ingredient to be ordered is:

1. For an eight ounce prescription the same number of drams as of grains or minims which it is desired to give in each dose.

2. For a four ounce prescription, one half as many drams as of grains or minims per dose.

3. For a two ounce prescription, one-quarter as many drams as of grains or minims per dose.

Explanation.— There are 60 doses of one dram each in an eight ounce prescription and therefore 60 times as many grains or minims must be ordered for the whole prescription as it is desired to give in each dose. But to reduce the resulting total number of grains or minims to drams it is necessary to divide by 60 (the number of grains or minims in one dram). The multiplication and division cancel each other, hence one merely changes the sign from grains or minims per dose to drams for the whole prescription, etc. •

CLASSIFICATION OF PRESCRIPTIONS

Prescriptions have been divided into several classes, but the distinctions are not sufficiently sharp to permit of accurate grouping. A prescription may contain but a single drug, or it may be composed of two or more drugs having similar or dissimilar actions. Further, it may be complex, consisting of two more or less distinct portions. Prescriptions which are written to be compounded according to the formula of the physician are spoken of as *magistral* or *extemporaneous*, while those which call for preparations the formulas for which are given in the Pharmacopeia or National Formulary are designated as *official* prescriptions. Almost all prescriptions are of the former, or extemporaneous, class.

A prescription which contains a large number of drugs is often spoken of as a “shot-gun” prescription, because it is given with the hope that one or more of its ingredients will “hit the

mark." Fortunately this form of prescription is practically obsolete at present, for it is utterly unscientific and frequently dangerous.

The simplest of prescriptions might be represented by the following:

R. Sulphonethylmethani..... 0.75

Fac chartulam i.

Sig.—Take dry on the tongue, wash down with water.

MR. SMITH.

J. MEDICUS, M.D.,
January 1, 1913.

The following would be regarded as compound:

R. Strychninæ Phosphatis..... 0.03

Ferri Phosphatis Solubilis..... 0.50

Elixiris Aromatici.....q. s. ad 60.00

Misce et fiat solutio.

Sig.—Take one (1) teaspoonful in water before each meal.

MR. SMITH.

J. MEDICUS, M.D.,
January 1, 1913.

The following illustrates the more complex type of prescription:

R. Buchu..... 10.0

Aquæ Bullientis..... 200.0

Fiat infusum et adde—

Potassii Citratis..... 80.0

Fac solutionem.

Sig.—Take one (1) tablespoonful every four (4) hours.

MR. SMITH.

J. MEDICUS, M.D.,
January 1, 1913.

Both the compound and complex prescriptions given above are magistral prescriptions.

An official prescription is indicated by the example given below:

R̄. *Liquoris Ferri et Ammonii Acetatis*. . . 60.0

Sig.—Take one (1) teaspoonful in water after each meal.

MR. SMITH.

J. MEDICUS, M.D.,
January 1, 1913.

In addition to the preceding, prescriptions may be grouped according to their physical properties, thus:

1. FLUID PRESCRIPTIONS:

Collodions
Collyria, or eye-washes
Decoctions
Draughts
Elixirs
Emulsions
Enemas
Gargles
Infusions
Liniments
Lotions or washes
Mixtures and suspensions
Mucilages
Solutions or liquors
Sprays

2. SOLID PRESCRIPTIONS:

Cachets
Capsules
Cerates
Granular effervescent salts
Papers
Powder (*pulvis*)
Powders (*chartulæ*)
Pills
Tablets
 (*a*) triturate
 (*b*) compressed
Troches

3. SEMI-SOLID PRESCRIPTIONS:

Pastes
Poultices
Ointments
Plasters

CHAPTER VI

THE DOSES OF DRUGS

THE question as to how much of a drug should be given to a patient is so greatly a matter of circumstance, experience, and observation that rules for the settling of this problem cannot be formulated. Aside from experience, there are certain factors which are so frequently encountered and which are of such importance in guiding one in the determination of the dose of any drug that it is deemed best to present some of them, at least, in the form of a suggestive discussion. The remarks about to be made are intended purely as suggestions, and an endeavor has been made to confine them to generalities, rather than to make them specific and concrete in character.

The Pharmacopeia and the National Formulary assign to each drug and to most preparations a dose which is supposed to represent the average amount generally given as a single dose. These so-called average doses are so subject to modification to conform to the varying conditions and requirements as to be of very little value except as indications of the relative activity of the several drugs. Those drugs having doses of a small fraction of a grain (10 mgm. or less) are obviously quite active, and in

most instances, also, quite toxic. Those with doses of several grains (0.1 Gm. or more) are usually both less active and less toxic. Those having large doses, a dram or more (over 4 Gm.), are, for the most part, relatively inactive, and usually not toxic. In the use of the last two classes a great degree of accuracy in gaging the single dose is not generally necessary. In the case of the first class, care and accuracy cannot be too great.

With this knowledge of the approximate activity and toxicity of any drug which is to be prescribed one should adapt the dose to the circumstances of the case. Such adaptation should take into consideration the following factors:

1. The **age** of the patient. The aged and the very young are *usually* more susceptible to the actions of drugs than is the average adult.

2. The **weight**. A consideration of this factor is of great importance, and at the same time is generally neglected. One not infrequently sees doses of the same size, of even a potent and dangerous drug, given to two patients, the one weighing nearly twice as much as the other. Negligence, lack of thought, or actual ignorance on the part of the physician is the cause of such a discrepancy in the doses actually received by the two patients. Such carelessness is inexcusable, and is not in accord with the modern scientific spirit. Not only is the weight to be taken into consideration, but some account ought to be taken of the obvious proportions of fat and muscle. Very obese persons, though heavy,

react in most cases rather like those of lesser weight, but of greater proportionate musculature. On the other hand, in the case of some of the lipoid soluble drugs, the fat individual will usually require a disproportionately larger amount than the one with a scanty supply of fat. Pathologic growths and collections of fluid may also increase the weight, and may, at the same time, not call for any change from the dose which would be suitable for a person of the same build, but free from the abnormal causes of increased weight.

3. **Sex** is a factor of considerable importance; especially so in regard to certain drugs which may have direct or indirect influence upon the menstrual function of the female. The additional factor of pregnancy must also be considered, as it may alter not only the dose, but also the choice of the remedy which is to be used. In the case of the opium series, the female sex frequently shows a peculiar response with excitement instead of depression.

4. **Idiosyncrasy**, so far as concerns man, may be defined as a constitutional peculiarity of response to the action of a drug. Idiosyncrasy may be individual (personal) or may be racial. The term is applied only to instances of abnormal response, and, through common usage, is often further restricted to instances of abnormal susceptibility. Strictly, the term is equally applicable to either abnormal susceptibility or to abnormal tolerance to the action of a drug. In the case of susceptibility, either the dose must be

reduced or some other drug chosen. When there is tolerance, the dose will have to be increased.

5. **Disease** itself may be a great factor in the determination of the dose, for some disease processes are said to bring about tolerance for certain drugs or the reverse. Intense pain, for example, is reputed to increase the tolerance for morphin to an appreciable extent.

All the factors just given modify, not only the single dose of a drug, but also the amount which can be given in a day.

In addition to the determination of the amount suitable for a single dose, and that to be taken throughout a day, the frequency of repetition of the dose must be determined by a consideration of the factors of absorbability and rate of excretion or destruction. For instance, a drug which is rapidly absorbed and similarly very rapidly excreted or destroyed would exert its action for only a relatively brief time after the administration of a single dose. If the effect is to be continuously maintained, the single dose must, therefore, be repeated at frequent intervals. On the other hand, where excretion is very slow, the action of a single dose may be maintained, in all probability, for a considerable time after its absorption, and hence the repetition of the single dose need be only at comparatively long intervals. The latter remark applies to a certain extent also to the case of a drug which is slowly and continuously absorbed.

Modern therapeutic methods have done a great deal toward simplifying the meeting of all these considerations, for now that we have much fairly definite knowledge of the actions of the several drugs, both therapeutic and toxic, and since we have greater purity of preparations and a larger number of pure principles, it is possible, by the use of but a single remedy at a time, to begin with a safe dose and more or less rapidly to increase the dose to the point of the appearance of the desired therapeutic effect, or until minor toxic symptoms develop. The dose can be scaled down from this point so as to meet the requirements of the individual case with considerable nicety. Such a procedure is the rational one, but it calls for a good knowledge of the pharmacology of the drugs which are employed, which is the basis for the intelligent use of medicinal agents.

After a consideration of the preceding remarks, one is inclined to think that extreme accuracy of dose is invariably necessary in the practice of prescription writing. Such, however, is not the case. For example, in the determination of the total amount of a drug which is to be directed for a prescription in order to give a desired amount in each dose, it is not usually necessary to carry out the calculation to small fractions in the case of the average drug. It would be as absurd to do this when prescribing a relatively non-toxic drug, and one which could be given in single doses ranging up to 10 or 20 grains or more, as it would be to speak of an ordinary walk for pleasure in

terms of inches in stating its length. In the use of such drugs it is customary, after calculating the total amount needed for the completed prescription, then to round this off, by addition or subtraction, to the nearest whole number of units. Thus one would not order 3 drams and 42 grains of such a drug, but would raise this to 4 drams, and express as such or as half an ounce. In the metric system such a "rounding-off" process does not usually bring about so great an alteration in the dose, for we speak in terms of smaller units. It is well to remember that, statements to the contrary notwithstanding, the ordinary prescription balance is not accurate to less than one-tenth of a grain (0.006 Gm.). In general, a variation of not over 10 per cent. in dosage is permissible, for it must be borne in mind that therapeutics is not an exact science.

In the case of very toxic and active drugs, such, for example, as atropin sulphate, ouabain, etc., of which the single dose is 0.6 mgm. ($\frac{1}{100}$ grain) or less, exactitude in calculation and in expression of the amount for the total prescription cannot be too great for safety. One should carry out the calculation with mathematic precision.

These last two paragraphs may be summed up in the direction to exercise common sense and be rational.

DOSES FOR CHILDREN

To guide one in the determination of the single dose suitable for children there are several rules:

1. Clark's Rule.—This is based upon the relative weight of the child as compared with the weight of the average adult. The average weight of the adult is taken to be 150 pounds. The rule is to *divide the weight of the child, in pounds, by the average weight of the adult,—150,—and to take this fraction of the adult dose.* Thus if the child weighs 50 pounds, this would be divided by 150, and the resulting fraction would be $\frac{1}{3}$. If the adult dose was 10 grains, the child should receive 3 grains. This is the only rule based on scientific principles, and is the one which should be used.

2. Young's Rule.—This rule is based upon the age of the child, regardless of the weight. It is to *divide the age of the child by the age plus 12, and the resulting fraction is the portion of the adult dose which is to be used.* Thus:

$$\frac{\text{age} = 6}{6 + 12} = \frac{6}{18} = \frac{1}{3}.$$

3. Cowling's rule is also based upon the age of the child. In this the fraction of the adult dose which is to be used is obtained by *dividing the age at the next birthday by 24.* Thus: age = 4; therefore $\frac{4}{24} = \frac{1}{6}$, which is the fraction of the adult dose to be used.

Both of these rules are based upon statistics of the weights of children at the different years of life, and the formulas thus worked out, though inflexible, give fairly accurate results when compared with the first method.

Recently Dilling has made a new analysis of

extensive weight statistics of children and finds that Young's formula is sufficiently accurate up to the eleventh year, but that thereafter it is very inaccurate and wholly unsatisfactory. The method of Cowling, on the other hand, follows the actual percentage dose based on weight quite well until the fifteenth year, after which it falls somewhat on the small side of the actual dose required. Dilling has worked out a new formula on the basis of his analysis. It consists in dividing the age by 20, to obtain the fraction of the adult dose which is required. Dilling also gives a formula for use with the metric system. The fraction of the adult dose in this case is obtained by dividing the age, multiplied by 5, by 100, thus $\frac{\text{age} \times 5}{100}$.

Gabius stated a series of fractions of the adult dose which were to be used at different ages, thus: for a child of one the fraction is $\frac{1}{12}$; of two, $\frac{1}{8}$; of three, $\frac{1}{6}$; of four, $\frac{1}{4}$; of seven, $\frac{1}{3}$; of fourteen, $\frac{1}{2}$; of twenty, $\frac{2}{3}$; and above twenty-one years of age, the adult dose. This method is said to be about as accurate as is that of Young, but it is cumbersome, and has been almost completely supplanted by one of the first three methods given.

CHAPTER VII

VEHICLES

A CONSIDERATION of the subject of vehicles involves, principally, a discussion of flavoring and coloring agents for fluid prescriptions. It also includes some of the factors of solubility, along with the means of disguising the more disagreeable tastes of some drugs when in solution or suspension.

FLAVORING

This phase of prescription writing applies only to such preparations as are to be taken by mouth, and chiefly to such as are fluid. As the administration of drugs in the fluid state and by mouth is by far the most satisfactory for general purposes, flavoring becomes a very important subject. Flavoring is not merely a matter of imparting a suitable taste to a preparation, but also includes the efficient disguising of disagreeable tastes. Many proprietary preparations owe their popularity mainly to the fact that they are very pleasantly flavored. The subject of flavoring and disguising flavors is a matter of special importance in the case of prescriptions for women and children. But it is not alone here that it is of importance, for the work of Pawlow and other physiologists has shown that the several functions of digestion, including absorption, are greatly influenced by the matter of taste.

There is a certain art in the selection of flavors for different purposes, but in this brief consideration the subject will be simplified as much as possible, and will be reduced to the giving of a few suggestions only. It is well to consult the tastes of the patient, as individuals differ widely in this respect and what is pleasant to one may be quite disagreeable to another. The student is advised to try the several vehicles suggested in order to become familiar with the taste of each and its capacity for disguising other and less agreeable flavors. This phase of the use of drugs, together with its associated subject, that of coloring, are the only ones which should be learned and used in a routine manner. As we take up some of the points in flavoring and coloring we will mention others, such as certain special uses of some of the vehicles and the general usefulness of others. The flavoring vehicles will be presented in three groups, according to their general properties as solvents.

AQUEOUS VEHICLES

These are chiefly the aromatic waters and syrups, and to a lesser extent the mucilages.

The **aquæ**, or aromatic waters, are suitable as vehicles and flavoring agents for the water-soluble salts and for preparations which are not intensely disagreeable in taste. The more commonly used of these are:

Bitter almond water, useful particularly in sedative cough mixtures and expectorants.

Anise water,
Cinnamon water.

Fennel water, all of which are especially pleasing to children.

Peppermint and

Spearmint waters are particularly useful as vehicles for the milder alkaline salts.

The **syrups** are in very common use where aqueous solvents and flavors are desired.

Syrup (formerly simple syrup); to this one may add an aromatic tincture for flavor.

Syrup of citric acid, and

Syrup of orange are useful for the alkaline salts of the organic acids. Both contain free citric acid and cannot be used with the alkaline carbonates.

Syrup of wild cherry,

Syrup of tolu—both of these are much used in expectorant mixtures.

Aromatic syrup of rhubarb,

Syrup of acacia,

Syrup of ginger, are all three particularly suited to children's tastes.

Compound syrup of sarsaparilla is used especially to disguise the taste of the iodids and of the salts of mercury.

Extract of malt is of dense consistence, and may be classed with the syrups. It is useful for suspensions and emulsions.

The **mucilages**, like the syrups and waters, are suitable for water-soluble substances, and, owing to their consistence, are frequently employed in the preparation of emulsions and suspensions.

Mucilage of acacia—this is precipitated by strong alcohol and it contains a slight excess of lime-water, which, being alkaline, may precipitate the salts of alkaloids.

Mucilage of tragacanth—this contains no lime-water, and is miscible with alcoholic preparations, though a light, flocculent precipitate is formed.

HYDRO-ALCOHOLIC VEHICLES

These are principally the elixirs, and are suitable for prescribing substances which are rela-

tively soluble in either water or dilute alcohol. The alcoholic content of the elixirs is generally about 25 per cent. They are aromatic and sweetened. The most important are:

Aromatic elixir, which is a very serviceable flavoring and vehicle for a wide range of preparations.

Elixir of glycyrrhiza—this is the aromatic elixir to which some fluidextract of licorice has been added. It is very useful for disguising the taste of acrid, bitter, and saline drugs. The glycyrrhizin (from the licorice) is precipitated by acids and acid salts, and hence these must not be used with this as vehicle.

ALCOHOLIC VEHICLES

These are suitable either as vehicles and flavoring agents for substances which are soluble in rather strong alcohol, or as flavors to be added in small amounts to other vehicles, such as syrups and elixirs. The alcoholic content is usually 50 per cent. or over. The two main classes are spirits and tinctures.

Tincture of sweet orange	Compound tincture of lavender
Tincture of bitter orange	
Tincture of lemon peel	Tincture of vanilla
Tincture of cardamom	Compound tincture of gentian
Compound tincture of cardamom	Tincture of calumba

The most commonly used spirits are:

Spirit of anise	Compound spirit of orange
Spirit of lavender	Spirit of peppermint
	Spirit of spearmint

COLORING

What has already been said concerning the desirability of suitable flavoring is equally ap-

plicable to coloring. Coloring is, however, simpler than flavoring, and in many cases the vehicle chosen as the flavoring agent also provides the color. This is the case with the elixir of glycyrrhiza, the compound tincture of cardamom, the compound tincture of lavender, and a number of other tinctures, the syrup of wild cherry, the compound syrup of sarsaparilla, and the extract of malt, and others.

Various colors may be imparted to a prescription as will be shown later. Blue is possible, but it should be avoided, as it is commonly reserved as a distinctive color for solutions of the bichlorid of mercury for external use. Bright green is sometimes seen in the case of ferrous salts and the alcoholic preparations of some of the vegetable drugs, in the manufacture of which no heat has been used.

For the purpose of artificially coloring prescriptions certain preparations may be used, some of which are suitable for alkaline and neutral prescriptions, and others for such as are acid in reaction. It is so seldom necessary to color the solid preparations artificially that these will not be considered; coloring agents for liquid prescriptions alone will be given.

COLORING AGENTS

In the following paragraphs the several more commonly used coloring agents will be discussed briefly with reference to the conditions under which they may be employed. The amounts

stated to give a definite color are those required for a 60 c.c. (2 ounce) prescription and the name of the color refers to the plate of Typical Colors given in the 1903 edition of Funk and Wagnalls' Standard Dictionary facing p. 1722. The matching was made with dilutions of fresh samples of the several agents, secured from a reliable source, but it should be remembered that these preparations are not standardized and that different samples may therefore give somewhat different shades of tinting. It is not necessary that precision be used in the amounts of the coloring agents employed, as a general rule, and other shades than those to be mentioned can readily be secured. If one chooses to adopt a distinctive coloring for his prescriptions he should then determine for himself the amount of the agent which must be used, or select one of the following, and adhere to it.

Tinctura Cardamomi Composita.—This contains cochineal and the remarks made below under *Liquor Cocci* apply to the use of this preparation. It also contains about 50 per cent. of alcohol and is miscible without precipitation with both aqueous and alcoholic solutions. A pale heliotrope can be obtained with 1 c.c. (15 minims), or a brilliant cherry with 5 c.c. (1¼ drams).

Liquor Carmini (N.F.).—This is suitable for coloring both neutral and alkaline preparations, either aqueous or alcoholic. It cannot be used in the presence of acids or acid salts as these precipitate the coloring matter. A very pleasing

pale rose color may be obtained from as little as 0.01 c.c. (about $\frac{1}{6}$ minim), and a dark rose from 0.1 c.c. ($1\frac{1}{2}$ minims).

Liquor Cocci (N.F.).—This is also miscible with both aqueous and alcoholic preparations and in dilute solutions is not precipitated by acids. It is stated to be suitable for either neutral or alkaline solutions as well, but with the latter it sometimes fades quite rapidly. In neutral or alkaline solution 0.1 c.c. ($1\frac{1}{2}$ minims) gives a rose color and 0.25 c.c. (4 minims) a magenta. In acid solution the same amounts give pale or dark pink, respectively.

Tinctura Persionis (N.F.).—This is miscible with both alcoholic and aqueous preparations and can be used for acid, alkaline or neutral solutions, although the reaction alters the color produced. In acid solutions 0.1 c.c. ($1\frac{1}{2}$ minims) gives a pale pink and 0.3 c.c. (5 minims) a bright pink color. In alkaline solutions the colors are mauve and lilac, respectively, with these amounts, while in neutral solutions mauve and heliotrope are produced.

Tinctura Persionis Composita (N.F.).—This has the same range of miscibility as the preceding, but it contains caramel and hence gives brownish colors. The colors are the same, irrespective of the reaction of the solution. With 0.25 c.c. (4 minims) the shade is buff and with 1 c.c. (15 minims) a pleasing ochre is produced.

Tinctura Caramellis (N.F.).—This is a 10 per cent. solution of caramel in about 25 per cent. alcohol and is compatible with both aqueous

and alcoholic prescriptions, irrespective of their reaction. A pale ochre is produced by 0.5 c.c. ($7\frac{1}{2}$ minims) and a bright ochre with 1 c.c. (15 minims).

Tinctura Lavandulæ Composita.—This preparation can be used with acid, alkaline and neutral prescriptions, but it gives a precipitate with water which must be removed by filtration. With alcoholic and hydro-alcoholic preparations it gives a clear solution. A light fawn color is produced by 1 c.c. (15 minims) and a brilliant orange by 5 c.c. ($1\frac{1}{4}$ drams).

Tinctura Croci (N.F.).—This is not precipitated by water and is suitable for coloring both aqueous and alcoholic prescriptions, irrespective of their reaction. A straw color is produced by 5 c.c. ($1\frac{1}{4}$ drams) and a brilliant canary by twice that amount.

Tinctura Hydrastis.—This is precipitated by water, but is miscible with alcoholic and hydro-alcoholic preparations, regardless of their reaction. The aqueous solutions can be cleared by filtration and retain their color, though slightly more is required for them than for the alcoholic to give the same shade. In alcoholic solution 0.5 c.c. ($7\frac{1}{2}$ minims) gives a brilliant lemon and 2 c.c. (30 minims) a bright yellow color.

NOTES

There are certain points in prescription writing which are quite important, but which cannot properly be brought under any of the previous divisions without causing a certain degree of con-

fusion. They are, therefore, assembled here for brief discussion.

Detailed directions to the patient may be omitted from the signatura in the case of prescriptions for vaginal or urethral application, etc.; that is, when the directions would be of such a nature that their presence on the label would unnecessarily offend the modesty of the patient. Under these conditions it is customary to order the prescription to be used "as directed." When such is done, the physician should give the detailed directions for the use of the prescription to the patient *in writing*, and if the prescription is one that would be poisonous or otherwise dangerous if taken internally, he should direct it to be labeled "for external use only," or should order a poison label to be placed upon the container. It is also often advisable to omit the patient's name from the prescription for the same reasons that call for the omission of the detailed directions for use.

When mixtures or suspensions are ordered, and the insoluble matter is likely to precipitate on standing, it is best to order the preparation to be well shaken before it is used. Such an order is commonly given in the signatura by simply writing, "**shake well.**" While it is the duty of the physician to indicate that such a direction be given to the patient, if it has been overlooked it is probable that the pharmacist will put such a label on the bottle without a special order.

The word "**poison**" may be directed to be put upon the label of the prescription by inserting it

in the signatura. Its use is advisable in the case of preparations for external use which would be dangerous if taken internally, for preparations of very toxic drugs in which great care is to be observed in the measuring of the dose, and in the case of prescriptions which, while not very dangerous for the adult, are likely to be so should they fall into the hands of children, or such as have an appearance similar to one or another of the common household remedies and which are, therefore, likely to be mistaken for them.

In addition to the use of the word "poison" on preparations for external use, or in the absence of this direction, it is best to specify in the signatura, "**external use only.**" When a poisonous preparation is prescribed for external use and the patient has, in addition, a prescription for internal use, it is best to order the one for external application to be dispensed in a large, or otherwise characteristic bottle, even if it only half fills it, so as to minimize the chance of error. It is preferable, when prescribing a poisonous drug for external or internal use, to have it dispensed in one of the special poison bottles, if such is obtainable. These are bottles of unusual shapes, and are generally distinctively colored.

The custom of having prescriptions refilled once or many times is very common, and it is highly advisable for the physician specifically to order that such shall not be done in the case of dangerous drugs. Some physicians have such an order printed on their prescription

blanks, but this is not necessary, as the writing of the words, "**non repetatur**," in some conspicuous place on the prescription will prevent its being refilled. It should be borne in mind, also, that the elixirs are moderately alcoholic (25 per cent. alcohol), and are, for the most part, very pleasant to the taste; hence they should not be continued for too long a time. This caution is a really necessary one, for the prolonged use of these preparations has been said to have initiated the alcoholic habit.

Prescriptions for Narcotics.—Under the provisions of a federal internal revenue law bearing on the sale, dispensing, etc., of opium or coca or their derivatives, preparations, etc., which went into effect on March 1, 1915 and which is commonly spoken of as the "Harrison Act," certain special points must be observed in the writing of prescriptions which call for the use of any of these narcotics. Each physician must be licensed, and with the granting of this license is given a registry number. All prescriptions coming under the scope of this law must comply with the following requirements:

1. They must be signed by the name of the physician *in full*.
2. The physician's registry number must be given on the prescription.
3. The date must be given, as of the day when the prescription was written and signed.
4. The address of the physician's office must be stated.
5. The full name and address of the patient

must be given. Such a prescription would appear as follows:

JOSEPH SMITH, M.D.
10 Jones Place,
New York,
N. Y.

R.

Opⁱi Pulveris..... 0.065
Bismuthi Subcarbonatis..... 1.0

M. et fac tales chartulas No. x

Sig.—Take one powder three times daily.

For,

MRS. CHARLES ROBERTS,
82 Bridge Avenue,
New York.

JOSEPH SMITH,

June 6, 1917.

Federal Registry No. 939

The law provides that prescriptions of this type must not be refilled.

When one has a patient who is too poor to pay the regular price for his prescriptions, and for whom one, therefore, desires to secure the lowest price from the pharmacist, the abbreviation "Pp.," which stands for *pauperissimus*, may then be written on the prescription. One should never do this, however, when he is receiving a fee from the patient for his own services.

CHAPTER VIII

INCOMPATIBILITY

THE application of a slight knowledge of chemistry, and the observation of some very common facts of solubility and miscibility, form the basis for the avoidance of most incompatibilities.

Definition.—Substances are said to be incompatible when they are incapable of existing together harmoniously; that is, when they undergo mutual interaction, either chemic or physical; when they are mutually immiscible or insoluble; or when they antagonize one another in action.

For the purpose of prescription writing incompatibility may be considered as being of one of four classes:

1. **Chemic**: Which involves a chemic interaction between the ingredients.

2. **Physical**: Which occurs when there is a change in the physical state of one or more of the ingredients, such as precipitation, liquefaction, etc.

3. **Pharmaceutic**: Occurs when either a chemic or a physical change takes place, which, while not affecting the medicinal properties of the preparation, renders it unsightly, nauseous, or otherwise unsuitable for administration.

4. **Therapeutic**: Occurs when the actions of the ingredients which are incompatible are antagonistic. This form of incompatibility will

not be considered in these pages, as it calls for a knowledge of pharmacology and therapeutics for its understanding.

In the following outline only the more important and more frequent incompatibilities occurring in the first three classes will be given. For a more detailed consideration of the subject the reader is referred to the work by Ruddiman or to other text-books. The chemic, physical, and pharmaceutic incompatibilities overlap one another to such an extent that a sharp separation cannot be made. Therefore they will not be grouped according to their respective classes in the following list, but the class to which each belongs may be determined readily by a consideration of the preceding definitions. No attempt has been made to deal with the reactions of some of the newer and more complex remedies, such as arsenobenzol, which require special technic for their use. The arrangement of the following list is alphabetic, according to the main classes of drugs and preparations. Where the expression "insoluble" is used, relative insolubility is meant.

I. Acids:

- (a) Mineral acids often displace the organic acids from their salts.
- (b) Almost all acids decompose the carbonates with the liberation of CO_2 .
- (c) Organic acids, except acetic, when combined with an alkali, generally precipitate the heavy metals, in the form of salts, from their aqueous solutions.

2. Alcohol:

- (a) Alcohol, in sufficient concentration, precipitates gums, albumin, and many inorganic salts from their aqueous solutions.
- (b) Inorganic drugs which are insoluble in water are usually also insoluble in strong alcohol.

3. Alkalis:

- (a) Free bases and alkaline carbonates and hydroxids precipitate the alkaloids from their salts in aqueous solution.
- (b) Alkalis react with hydrated chloral to form chloroform.

4. Alkaloids:

- (a) The salts of alkaloids, with most organic acids, are insoluble in water.
- (b) Alkaloids are precipitated from their salts in aqueous solution by the alkaline carbonates and hydroxids and by free bases.
- (c) Salicylates, benzoates, iodids, and bromids precipitate most alkaloidal salts from their aqueous solutions in combination with themselves.
- (d) Tannic acid or potassium-mercuric iodid precipitates alkaloidal salts from their aqueous solutions.

5. Carbonates:

- (a) See Alkalis and (b) under Acids.
- (b) Potassium or sodium carbonate in solu-

tion precipitates the salts of all other common metals.

- (c) The bicarbonates of the alkaline earths have about the same incompatibilities as the carbonates.

6. Chloral hydrate (hydrated chloral):

(a) When triturated in a dry state with camphor, menthol, phenol, and some other substances, hydrated chloral forms a liquid.

(b) Alkalis react with hydrated chloral to form chloroform.

7. Chlorates and other oxidizing substances:

When these are triturated dry with any of a number of organic substances, and substances which are readily oxidized, an explosion may occur.

8. Epinephrin:

This is decomposed by alkalis and the alkaline carbonates and hydroxids.

9. Glucosids:

These are decomposed by mineral acids, alkalis, and ferments.

10. Iron:

A. Ferric salts:

(a) Are precipitated from aqueous solution by alkaline hydroxids and carbonates in the form of the reddish ferric hydroxid.

(b) Tannic and gallic acids give a blue-black solution or precipitate with ferric salts.

- (c) Salicylates and phenol give a violet color in dilute solutions with ferric salts.
- (d) Ferric salts gelatinize acacia in solution.

B. Ferrous salts:

Ferrous salts give white precipitates with tannic and gallic acid; these turn black on standing, due to conversion into the ferric.

11. Mercury:

- (a) Mercuric salts precipitate alkaloids, glucosids, proteids, tannin, and antipyrin.
- (b) Mercuric salts of the halogens are precipitated by the fixed alkaline hydroxids, the precipitate being yellow.
- (c) Mercurous salts of the halogens are precipitated by the fixed alkaline hydroxids and by lime-water, the precipitate being black.
- (d) The bichlorid of mercury forms the double salt, potassium mercuric iodid, with potassium iodid. This is soluble in an excess of either of the original salts.
- (e) The salts of mercury should not be prescribed in solutions together with the salts of other metals.

12. Oils:

- (a) The *fixed oils* and fats form soaps with alkaline hydroxids, metallic oxids, and lime-water.
- (b) The *volatile oils* may be thrown out of aqueous solution by the addition of

soluble salts in considerable concentration.

13. Resins :

(a) Resins form soaps with the carbonates and alkaline hydroxids.

(b) They are precipitated from their alcoholic solutions by water.

14. Salts of metals :

The salts of most metals precipitate proteids, tannin, acacia, alkaloids, and some are precipitants of organic substances in general.

15. Spirits :

The volatile substance is thrown out of solution by water in the case of all official spirits except those of nitrous ether and ammonia.

16. Water :

Water precipitates many alkaloids, some glucosids, neutral and bitter principles, *resins* or *resinous matter*, and *fats* or *fatty matter*, from their alcoholic solutions.

17. Waters (Aquæ) :

Some soluble inorganic salts, when added to the aromatic waters in considerable concentration, throw the volatile oil out of solution. This is, in part at least, due to the reduction of temperature caused by the solution of the salt, but is not wholly so.

GENERAL SUGGESTIONS ON INCOMPATIBILITY

The following general suggestions will be found of value in avoiding the occurrence of incompati-

bility in prescriptions, and will aid in the learning of the several special groups of incompatibilities:

1. Order only one active drug in a prescription, and use the simplest vehicle possible.

2. Water is the most nearly universal of solvents. It does not dissolve some of the glucosids, many of the alkaloids, neutral and bitter principles, resins and resinoids, fats and fatty matter, and vegetable extractives in general.

3. Alcohol is second only to water in its solvent powers. In general, the active constituents of vegetable drugs are more soluble in alcohol than in water or in diluted alcohol. Alcohol does not dissolve most of the fixed oils, gums, proteids, and, in general, it is not a good solvent for the metallic salts.

4. Glycerin often materially aids the solution of drugs in water, particularly the salts. It does not mix with most of the fixed oils.

5. In general, it is inadvisable to mix strongly alcoholic preparations with water or with aqueous preparations.

6. It is usually equally inadvisable to combine alcohol or alcoholic preparations, unless very dilute, with concentrated solutions of water-soluble substances.

7. Substances familiar as chemic reagents should neither be mixed together nor used in combination with other substances unless in extremely dilute solution.

8. Acids, or substances which are acid in reaction, should not be mixed with alkalis or substances which are alkaline in reaction.

9. In general, all vegetable substances and their galenic preparations contain tannic acid or substances which react as does tannic acid.

10. Whenever there is doubt as to the complete solubility of a drug in the quantity of solvent contained in a single dose of a prescription, it is well to increase the volume of the dose of the prescription by the addition of more of the solvent, or by the introduction of some additional solvent vehicle.

The following substances may be considered as being almost **universally incompatible** :

Strong mineral acids	Potassium permanganate
Strong alkalis	Potassium iodid
Bichlorid of mercury	Arsenic
Nitrate of silver	Tannic acid
Lead acetate	Alkaloids
	Salts of metals

CHAPTER IX

MODES OF ADMINISTRATION OF MEDICINAL AGENTS

As there are many different ways of employing medicinal remedial agents, it is deemed advisable to mention some of the more important of them, and to make a few suggestions relative thereto, which may be of use to the prescriber. Only those methods will be discussed which are designed for securing the systemic action of the remedy.

By Mouth.—This is much the commonest mode of administration, and, in general, is the most satisfactory. It has the advantage of being easy for the patient, it is usually effective, and, if properly managed, is subject to considerable control. Almost any of the common preparations may be used by mouth. One has to consider several factors, however, in employing this method of administration. Among these may be mentioned the questions of taste of the preparation, absorbability, injury to the gastric mucosa, or its irritation, with consequent nausea and vomiting; solubility of the drug in the vehicle, if fluid; if solid, the ease with which it disintegrates in the stomach and its solubility in the gastric juice; convenience to the patient; and, lastly, the adaptability of the preparation to a given form suitable for administration.

Of all the forms suitable for oral administration, the solution is the best, as both disintegration and solubility in the stomach cease to be elements of doubt, and, in general, absorption is readier. Fluid preparations containing alcohol are usually more readily absorbed from the alimentary tract than are aqueous ones, on account of the mildly irritant action of the alcohol upon the mucous membrane. It must be remembered, however, that the continued use of moderately strong alcoholic preparations may lead to the development of a taste for alcohol, and not a few owe the origin of this taste to the indiscriminate use of alcoholic preparations in medicine.

Other than the solutions there are the mixtures, suspensions, emulsions, pills, powders, capsules, cachets, compressed tablets, and tablet triturates, etc., which may be given by mouth.

The dry solid preparations possess an advantage over the liquid ones in being more convenient for carrying and for taking. Some of them, pills and compressed tablets, have the great disadvantage of being often somewhat slowly disintegrated and dissolved in the stomach, and they have even been known to pass undissolved into the intestine, there to remain for days, and even to be found there at autopsy, or to be passed in the feces. The other solid preparations mentioned are equally convenient and are readily disintegrated.

It is feasible to coat pills in such a way as to have them pass through the stomach without

disintegration, and then to have them broken down in the intestine. This may be accomplished by careful coating with salol or with kaolin. Keratin has enjoyed the reputation of accomplishing the same end, but it is almost impossible to obtain any of the pure product, and recent researches have shown that the commercial keratin does not resist the action of the gastric juice.

Convenience to the patient and the avoidance of disagreeable tastes which can be ill disguised in any other way should constitute the main reasons for the use of the solid preparations rather than the liquid ones.

By Rectum.—When, for one reason or another, administration by mouth is not possible or is not desired, a number of drugs may be given by rectum. It is generally advisable to give only those which are soluble in water, salt solution, or very dilute alcohol by this channel. Some may be successfully introduced, however, in the form of emulsions, suspensions, or as suppositories. Drugs which are irritant to mucous membranes should not be given by rectum unless it is desired to have them excite intestinal peristalsis. There is a fallacy perpetuated in many of the text-books regarding the relation of the rectal dose of a drug to its oral dose. There is no fixed relation which will apply even to a limited class of substances. The appropriate rectal dose must be determined for each individual drug. When a drug is to be given by rectum and is intended for absorption, if in fluid form, the total volume in-

jected should not exceed 120 to 150 c.c. (4 to 5 ounces) for an adult.

Hypodermic Injection.—Drugs with small single doses, and such as are soluble in water or salt solution and are relatively non-irritant, may be injected into the subcutaneous tissues, whence they are absorbed. Very dilute alcohol may also be used as the solvent. Some insoluble drugs, as the salicylate of mercury, when injected intramuscularly, are slowly absorbed from the tissues. Some more or less irritant drugs, and many of the soluble drugs, may be injected deep into the muscular tissues of the buttocks or lumbar regions, whence they enter the circulation, usually very rapidly.

Hypodermic injection is a very satisfactory and certain mode of administering many drugs, but there exists in the minds of the laity an intimate association between the use of the hypodermic syringe and the administration of morphin or other habit-forming narcotic. Owing to this fact the method must be used with considerable caution, for it has been said to have led to the formation of the narcotic habit.

The fallacy regarding the relation of the dose for rectal administration to that used by mouth is also to be found in statements as to the ratio between the hypodermic and oral doses. Again it must be emphasized that no fixed ratio exists, even in the case of different substances of the same class. The suitable hypodermic dose of each drug must be determined by experience alone.

Intravenous Injection.—No method is either so certain or so rapid in the production of results as is this. But it requires a considerable degree of skill, a special technic, and is applicable to a very limited number of drugs. It is to be borne in mind that one should never use more than a single drug in an intravenous injection; that saline solution, approximately isotonic with the blood, and made with freshly distilled water only, should be the solvent; that extreme caution regarding sterility of the solution, instruments, and the skin, both of patient and operator, must be observed; and that the injection fluid must be a perfect solution, absolutely free from insoluble particles of any size.

The other methods of administration are far less commonly used and may be dismissed with a few words. Certain drugs may be given by **inhalation** in the form of a nebula, or very fine spray, or as the vaporized drug. **Fumigation**, or the exposure of the patient to the vapor of a volatile drug, such as mercury, has been employed, but it has recently been suggested that in this method the absorption of the drug takes place chiefly through the respiratory tract. Medicated **baths** are seldom used at the present time except for the local action of the drug upon the skin. **Inunction**, or the introduction of a drug through the unbroken skin, is most frequently employed in the administration of mercury. Some other drugs can be absorbed through the skin, but they are seldom given in this way. **Cataphoresis** is the introduction of

a drug through the unbroken skin or mucous membrane by means of electrolytic dissociation. It is a method rarely used, and requires special technic and apparatus.

In addition to the administration of drugs for their effects after absorption there are many methods of employing them for the sake of their local actions—the ointments, pastes, plasters, lotions, etc., supply the forms for this mode of administration.

CHAPTER X

SUGGESTIONS FOR SUITABLE METHODS OF PRESCRIBING OFFICIAL PREPARATIONS

THE difficulties encountered in writing satisfactory extemporaneous prescriptions are not merely those of the proper use of Latin, but are due probably even more to a lack of confidence in one's ability to combine the various drugs and preparations and to make use of the vehicles and flavoring and coloring agents. This lack of confidence has been a potent factor in promoting the use of ready-made mixtures and has led many physicians to take much of their therapeutics from the manufacturers of such mixtures, who have no knowledge whatever of rational treatment. This can be corrected best by giving the physician a knowledge of the rudiments of pharmacy. While it is beyond the scope of the present volume to enter into the subject of pharmacy, the following brief suggestions are offered to illustrate some of the methods of combining the several general classes of official drugs and preparations in the form of extemporaneous prescriptions. No attempt has been made to include all of the methods of combination, but the suggestions have been restricted to only the more suitable or the commonest methods and are subject to elaboration at the discretion of the student who cares to perfect

himself in the art of prescribing. At various points reference will be made to the succeeding list of practice prescriptions for concrete illustrations of the suggestions given. The classes considered are taken up in alphabetic order according to their English names.

Acids.—The concentrated acids are used mainly for external application as caustics and should be ordered alone. The dilute acids may usually be prescribed in combination with most of the tinctures, the syrups and with many aqueous preparations. They should not be ordered in prescriptions containing the carbonates or other alkaline salts. (R_x No. 10.) Where the acids are prescribed with active tinctures containing alkaloids these latter are usually converted into the salts of the acids and are generally soluble in the vehicle, whether aqueous or alcoholic.

Decoctions.—The strength of these aqueous preparations is fixed by the Pharmacopeia at 5 per cent. and unless otherwise directed they will be made of such strength. The method of preparation is also prescribed in the U.S.P. and all that is necessary is to order the desired drug and direct that a decoction be made. The decoctions may be given alone, or in combination with various aqueous preparations. Water-soluble substances may be prescribed to be dissolved in them. They should always be prepared fresh and should be ordered in amounts to last only a few days on account of their ready decomposition. Some official decoctions are

stronger than 5 per cent. but this difference will be readily learned for the few instances.

Elixirs.—These are of two classes: (1) Pleasant vehicles, such as the aromatic elixir and the elixir of glycyrrhiza; and, (2) Medicated elixirs, containing one or more active ingredient. The former class has been discussed under the subject of vehicles. (R̄ Nos. 16 and 21.) They are hydro-alcoholic preparations which have a wide range of usefulness as solvents and pleasant flavoring agents. Various organic and inorganic salts, including those of many alkaloids, may be prescribed in the elixirs, with or without the addition of water or alcohol. The medicated elixirs are usually used alone as pleasant forms for the administration of the contained active ingredients.

Emulsions.—As a general rule emulsions should be used alone, though certain other drugs may be added to them, such as the medicated syrups (R̄ No. 24) and various water-soluble drugs. As most of them depend upon acacia for the suspension of the emulsified oil or oleo-resin, alcoholic preparations should not be added to them, except in very small amounts, as alcohol precipitates gum and will destroy the emulsion. Emulsions may be prepared extemporaneously and all that is necessary is to prescribe the dose of the active drug, order acacia, sugar and a flavor in indefinite amounts and complete with the requisite amount of water or syrup, directing the pharmacist to make an emulsion. (R̄ Nos. 13 and 17.) If sugar is not desired gly-

cerin may be substituted, or small amounts of saccharin, but the addition of sugar increases the viscosity of the menstruum and aids in maintaining the emulsion.

Extracts.—These are best given in the form of pills or, when dry, as powders or in capsules or cachets. They are usually quite active when made from potent drugs and require dilution with other substances. They may also be incorporated in ointments, suppositories and other solid or semisolid preparations. Their use will be mentioned further under the subject of pills. Since they are used almost exclusively in solid preparations the question of pharmaceutical incompatibility seldom arises. (R̄ Nos. 4 and 5.)

Fluidextracts.—These may be prescribed as such, but they are ordinarily too potent to be given without some dilution. They are usually prepared with the aid of alcohol and their dilution is generally best accomplished by using some alcoholic menstruum such as a tincture or an elixir. Some few are soluble also in aqueous vehicles. In addition to prescribing them in solution, they may be incorporated with other ingredients to make pills, tablets, suppositories, ointments, etc.

Fluidglycerates.—These are official in the N.F. and are of the same strength as fluidextracts. They are made with a menstruum of approximately fifty per cent. each of glycerin and water and can be prescribed with the aqueous vehicles, or with the elixirs. As the dose is usually small they require dilution for con-

venient administration. The fluidglycerate of glycyrrhiza is made with the aid of ammonia and cannot be prescribed with menstrua containing acid, or with acids or acid drugs, as the glycyrrhizin is precipitated by acids.

Infusions.—The official infusions may be prescribed alone, or water-soluble drugs may be added to them, such as the salts. (R_y No. 15.) Like the decoctions, they are prone to undergo fairly rapid deterioration and should not be prescribed in amounts which will last for more than a few days to one week.

Mixtures.—These are suspensions of insoluble substances in water with the aid of mucilage. They usually also contain sugar or syrup. They may be ordered prepared extemporaneously by prescribing the desired dose of the drug to be suspended and a sufficient quantity of acacia or mucilage, sugar or syrup, and water to make up the desired volume. (R_y No. 11.) The pharmacist should be directed to make a mixture and the preparation should be ordered to be shaken well before it is taken. The official mixtures can be combined with a wide range of drugs and preparations, but alcohol would precipitate the mucilage and too great a dilution would render the suspension of the insoluble substance incomplete. Where tragacanth or its mucilage is used for the suspension alcoholic preparations may be added, as this gum retains its capacity for remaining in suspension and for holding other substances in the presence of alcohol.

Mucilages.—These are suitable vehicles for the suspension of insoluble substances in water or for the emulsification of oils and oleoresins. (R̄ Nos. 11, 13 and 17.) They have been discussed in the chapter on vehicles as well as in the preceding section.

Oils.—The fixed oils or fats are best given in the form of emulsions or inclosed in capsules. (R̄ Nos. 9, 14 and 17.) Some are also suitable for use in ointments.

The volatile oils have their greatest use in the form of the aromatic waters and the spirits, or as flavoring agents, and as such have been discussed in the chapter on Vehicles. (R̄ Nos. 11, 17 and 19.)

Oleoresins may be given in the form of emulsions, or incorporated in pills, suppositories, or ointments, or inclosed in capsules. (R̄ No. 13.)

Pills.—There are many official pills which may be prescribed as such. The various solid and semisolid, and some of the fluid, official drugs and preparations may be combined in the form of pills. The art of making pills is a complex and difficult one, and the choice of suitable diluents and excipients requires considerable pharmaceutical skill and experience. It is, therefore, better to leave this phase of the prescription to the discretion of the pharmacist, and merely to prescribe the therapeutic ingredients in the desired amounts and direct pills to be made, than to attempt a mastery of the art of choosing the excipients. The extracts, oleoresins, resins, glycerites, and some other official preparations are

often best given in pill form. The drugs which may be chosen for incorporation into pills must be relatively active in order that a sufficient dose may be contained in a small bulk. Pills should not exceed 0.5 Gm. ($7\frac{1}{2}$ grains) in weight, and may be much smaller than this. When they weigh less than 0.06 Gm. (1 grain) they are usually called granules. Aside from the disadvantages already mentioned regarding the use of pills, it should be remembered that, as they are of fixed size, the graduation of the dose is possible only within rather wide limits, unless a new prescription is written for each change. Pills may be coated with inert powders, gelatin, sugar, etc., for general use, or they may be prepared to pass through the stomach without disintegration by coating them with salol or kaolin, which are not soluble in the gastric juice. The uselessness of keratin for this purpose has already been mentioned. The N.F. gives directions for the extemporaneous coating of pills with gelatin, sugar, cocoa, tolu, silver and salol and it is sufficient merely to direct the pharmacist to coat the pills with the substance desired. When no other coating is ordered the pills will be dispensed with some inert dusting powder such as lycopodium, talc, glycyrrhiza or starch, so that they will not stick together. (R_x No. 4.)

Powders.—Drugs in powdered form may be combined as such and prescribed in capsules or cachets for internal administration, or they may be ordered mixed with water or taken dry on the tongue. Some readily soluble substances may

be prepared in the form of effervescent powders or salts, by the addition of a carbonate and an organic acid, which will react with the liberation of CO_2 when dissolved. Where the prescription is to be dispensed in capsules each dose should not exceed 0.6 Gm. (10 grains). If the dose is materially larger than this cachets may be used in place of capsules. (R̄ Nos. 5, 6 and 7.)

Resins.—The resins are, in general, best given in the form of pills or suppositories. Their taste is usually very disagreeable and not readily disguised in fluid preparations.

Solutions.—The official liquors are suitable for administration as such, or they may be combined with other aqueous preparations and water-soluble substances. It must be remembered, however, that the addition of other solid substances, such as salts, may cause the liquors to become supersaturated and result in the precipitation of a portion of one or more of the ingredients.

Spirits.—The spirits are generally not used as such, but are added to other preparations as flavoring agents, which use has been mentioned previously.

Syrup.—The syrups have been discussed under the head of vehicles in a preceding chapter. (R̄ Nos. 13, 17 and 20.)

Tinctures.—These are suitable, in many cases, for administration in their original form. Many can be diluted with water and combined with aqueous preparations; some, however, throw down a heavy precipitate of resinous

matter under these circumstances. Tinctures may be combined with one another or with the elixirs. Substances soluble in moderately concentrated or strong alcohol may be combined with many of the tinctures. The incompatibilities of the alkaloids, glucosids, and tannin must be constantly borne in mind when combining active tinctures with other drugs or preparations. (R̄ Nos. 10, 12, 16 and 21.)

Triturates.—These form a convenient means of administering active solid drugs which can be reduced to a fine powder. They are solid, and when made into tablets, have many of the advantages of pills, in addition, disintegrating readily in the stomach. They may be ordered to be made extemporaneously by prescribing indefinite amounts of milk sugar and alcohol, along with the specified amount of the active constituent, and directing the pharmacist to prepare tablet triturates. (R̄ No. 8.)

Vinegars.—The vinegars may be prescribed in aqueous, syrupy, or mildly alcoholic vehicles or with other preparations having these characteristics. They may also be used in combination with some of the tinctures. As they are acid in reaction, they should not be combined with alkalis or alkaline substances.

Waters.—The waters are used chiefly as vehicles, and as such have already been discussed. (R̄ No. 19.)

Wines.—The official wines are usually very pleasant forms for the administration of the drugs which they contain.

PREPARATIONS FOR EXTERNAL USE

The **cerates**, **oleates**, and **ointments** are waxy or oleaginous preparations which are intended for external application, and which, in general, contain medicinal agents intended for their local action at the site of application. Some are intended for absorption. The medicament may be in the form of an extract, alkaloid, volatile oil, or metallic salt, etc. The base is such that it will remain solid or semisolid at ordinary room temperature, but will melt or soften at that of the body. Bland, inert fats and oils, with or without added waxes, are the usual excipients. The simple cerate (*Ceratum*) of the U.S.P. provides an excellent basis for the extemporaneous preparation of medicated cerates, while for ointments white petrolatum, ointment of rose water, wool fat and benzoinated lard are the commonest and most satisfactory bases. (R̄ No. 1.)

Cataplasms or poultices are used as means of applying moist heat, and are usually devoid of inherent medicinal properties. Flaxseed is the commonest in use. In some instances they are supposed to exert a local medicinal action, or even to provide a means of bringing about the absorption of a drug. They probably, however, do not accomplish the latter result.

The **glycerites** are mixtures of glycerin with starch or some active medicinal agent, and are intended for local effect at the site of application. The glycerite of starch is often used as an excipient in making pills.

Liniments are intended solely for external application, usually with friction. They commonly contain some local irritant, such as turpentine, camphor, etc. They are usually partly volatile, and are soapy or oleaginous, to provide lubricant properties for the application of friction. Liniments may be prepared extemporaneously by using the official soap liniment as a solvent for the drug desired, which is usually one of the volatile oils or stearoptens.

Lotions or washes are aqueous medicated preparations designed for the local action of their medicinal constituents. They are generally somewhat germicidal or mildly antiseptic in action.

Medicated papers are either intended for local application, as the official *emplastrum sinapis*, or they may be burned for the effects of their fumes, as the potassium nitrate paper.

Plasters and **pastes** have higher melting-points than the ointments and oleates, and are not intended to melt at the body-temperature. Lead plaster is the common basic ingredient of the former, while that for the pastes is usually the official (N.F.) *pasta dextrinata*.

Powders are combinations of drugs in powdered form, and may be used as dusting-powders or protectives (R_x No. 3), or some of them, such as the common licorice powder, may be intended for internal administration.

Suppositories are solid medicated preparations for insertion into the open body cavities, where they may exert their local action, or

whence they may become absorbed. Cocoa-butter or a stearate soap with glycerin is probably the commonest base. Fluidextracts, extracts, oleoresins and various other preparations may be prescribed in the form of suppositories. A prescription for their extemporaneous preparation need merely state the desired dose of the active ingredient, along with an indefinite amount of cocoa butter. They should not exceed 4.0 Gm. (1 dram) in weight, and are better if about half as large.

Troches are solid preparations containing medicinal agents for local action in the buccal and adjacent cavities. They are usually demulcent or astringent, and are to be dissolved slowly in the saliva. These may be ordered prepared extemporaneously by prescribing indefinite amounts of tragacanth, sugar, water and a flavoring agent, such as vanillin or one of the volatile oils, along with the desired amount of the active ingredient. The pharmacist should be directed to make troches.

The brief suggestions which have been given are merely intended to call attention to the methods of using the several official types of preparations, and should be amplified in each instance by consulting the Pharmacopeia or National Formulary, or a text-book on pharmacology and therapeutics. The incompatibilities previously discussed must, of course, be borne in mind when making original combinations with any of the preparations. A knowledge of pharmacology and therapeutics is necessary for the full appreciation of the suggestions outlined.

CHAPTER XI

PRACTICE PRESCRIPTIONS

THE following prescriptions are presented primarily to give the student some practice in applying the directions given in the preceding pages. They have been chosen, also, with other ends in view, namely:

1. As fairly representative of the modern simple prescription.
2. To illustrate several of the commoner types of prescriptions for various purposes.
3. To give concrete examples of certain of the suggestions made in Chapter X, in which references to them are made.

The doses ordered have been stated in both systems of weight and measure so that the prescriptions may be written in either the Metric or the Apothecaries' system, as the instructor may direct.

Write prescriptions according to the following directions:

FOR LOCAL EXTERNAL APPLICATION

1. For 30 Gm. (1 ounce) of an ointment to contain 5 per cent. of methyl salicylate in white petrolatum. Direct it to be rubbed into the skin thoroughly for the relief of pain. For external use only.

2. For 60 c.c. (2 ounces) of a collyrium to contain 2 per cent. of boric acid and 0.6 Gm. (10 grains) of sodium chlorid in equal parts of camphor water and distilled water. To be used as an eye wash with an eye cup.

3. For an antiseptic dusting powder to contain 2 per cent. of salicylic acid and twice as much boric acid in equal parts of stearate of zinc and purified talcum. Direct it to be used externally as a dusting powder.

PREPARATIONS FOR INTERNAL ADMINISTRATION

A. Solid:

4. For laxative pills, each to contain 8 mgm. ($\frac{1}{8}$ grain) of aloin, twice as much extract of belladonna leaves and 0.12 Gm. (2 grains) of extract of cascara sagrada. Order them to be coated with gelatin. Direct one or two to be taken at bedtime.

5. For antidiarrheal powders each to contain 16 mgm. ($\frac{1}{4}$ grain) of extract of opium and 2 Gm. (30 grains) of bismuth subcarbonate. Direct them to be taken dry on the tongue and swallowed with the aid of water.

6. An hypnotic for use in the presence of pain, each dose to contain 0.03 Gm. ($\frac{1}{2}$ grain) of codein and 0.6 Gm. (10 grains) of trional. Order dispensed in cachets. Direct one to be taken an hour before bedtime.

7. An analgesic for neuralgic headache, each dose to contain 0.2 Gm. (3 grains) each of aspirin and phenacetin and 0.065 Gm. (1 grain)

of caffein. Dispense in capsules. Direct one to be taken every four to six hours for relief of headache.

8. Tablet triturates to be made, each to contain 2 mgm. ($\frac{1}{30}$ grain) of strychnin sulphate diluted with milk sugar. Order one to be taken every four hours during the day and prescribe enough to last about one week.

9. An antifermentative prescription, each dose to contain 0.16 Gm. ($2\frac{1}{2}$ grains) of salol and an equal amount of castor oil. Order dispensed in soft capsules. Direct one to be taken every four hours.

10. A bitter stomachic, each teaspoonful dose to contain 0.6 c.c. (10 minims) each of dilute hydrochloric acid and tincture of nux vomica, using the compound tincture of gentian as the vehicle. Direct it to be taken in a wine glass of water immediately before each meal.

11. An antacid mixture, each tablespoonful dose to contain 0.6 Gm. (10 grains) of bismuth subcarbonate, twice as much magnesium oxide and 2 Gm. (30 grains) of bicarbonate of soda, to be suspended in water with the aid of acacia and flavored with saccharin and oil of peppermint. Order to be taken one hour after each meal. Direct to be shaken well.

12. A carminative bitter, each dose to contain 0.3 c.c. (5 minims) of tincture of capsicum, twice as much tincture of nux vomica and 1 c.c. (15 minims) of tincture of ginger, using the tincture of calumba as the vehicle. Direct one

teaspoonful to be taken in half a wine glass of hot water half an hour after each meal.

13. An anthelmintic emulsion, each tablespoonful dose to contain 4 Gm. (1 dram) of oleoresin of aspidium, 2 c.c. (30 minims) of spirit of chloroform and 4 c.c. (1 dram) of glycerin, suspended in syrup of ginger with the aid of acacia. Prescribe enough for only two doses. Order taken on an empty stomach.

14. A single dose of 1 c.c. (15 minims) of oil of chenopodium in castor oil to make 30 c.c. (1 ounce). To remove round worms. Direct to be taken on an empty stomach.

15. A diuretic containing 1 Gm. (15 grains) of potassium acetate per tablespoonful dose in infusion of buchu. Direct to be taken every four hours during the day and prescribe enough to last four days, thus avoiding deterioration.

16. An alkaline prescription to allay bladder irritation, each teaspoonful dose to contain 0.6 Gm. (10 grains) of potassium citrate and 2 c.c. (30 minims) of tincture of hyoscyamus, using equal parts of water and aromatic elixir as the vehicles. Direct it to be taken four times daily.

17. An emulsion of castor oil for a child, each tablespoonful dose to contain 6 c.c. (1 1/2 drams) of castor oil, emulsified in syrup with the aid of acacia and flavored with oil of cinnamon. Order a dose to be taken at night when needed.

18. An antiseptic to acidulate the urine, each teaspoonful dose to contain 1 Gm. (15 grains) of sodium benzoate dissolved in water. Flavor

with methyl salicylate and color rose with liquor cocci. Order a dose taken four times daily and prescribe enough to last about one week.

19. A sedative for cough, each teaspoonful dose to contain 0.01 Gm. ($\frac{1}{6}$ grain) of codein phosphate and 1 c.c. (15 minims) of glycerin. Use bitter almond water as the vehicle and color ochre with tincture of caramel. Direct to be taken every four hours.

20. A nauseant expectorant to liquefy the bronchial secretion, each teaspoonful dose to contain 0.3 Gm. (5 grains) of ammonium chlorid and 1 mgm. ($\frac{1}{60}$ grain) of tartar emetic, using syrup of orange as the vehicle. Direct to be taken every three hours until nausea develops, then three times daily.

21. An antiasthmatic to relax bronchial spasm, each teaspoonful dose to contain 0.6 Gm. (10 grains) of potassium iodid and 0.3 c.c. (5 minims) of tincture of belladonna leaves, in elixir of glycyrrhiza as the vehicle. Order to be taken four times a day and followed by half a glass of milk or water.

22. An hypnotic for use in the absence of pain, each dose of two teaspoonfuls to contain 0.3 Gm. (5 grains) of hydrated chloral and three times as much sodium bromid. Use water as the vehicle. Direct to be taken an hour before retiring and diluted with half a glass of water. Prescribe enough for eight doses.

23. Prescribe Fowler's solution diluted with distilled water so that each teaspoonful dose will

contain 0.2 c.c. (.3 minims) of the drug. Direct to be taken three times daily after meals, in a small amount of water.

24. A hematinic tonic for a child, each tablespoonful dose to contain 1 c.c. (15 minims) of the syrup of the iodid of iron in the official (N.F.) emulsion of cod liver oil with malt. Direct to be taken after each meal.

25. A suspension of quinin disguised by aromatic syrup of eriodictyon, each teaspoonful dose to contain 0.3 Gm. (5 grains) of quinin. Direct to be taken every four hours, and to be shaken before using.

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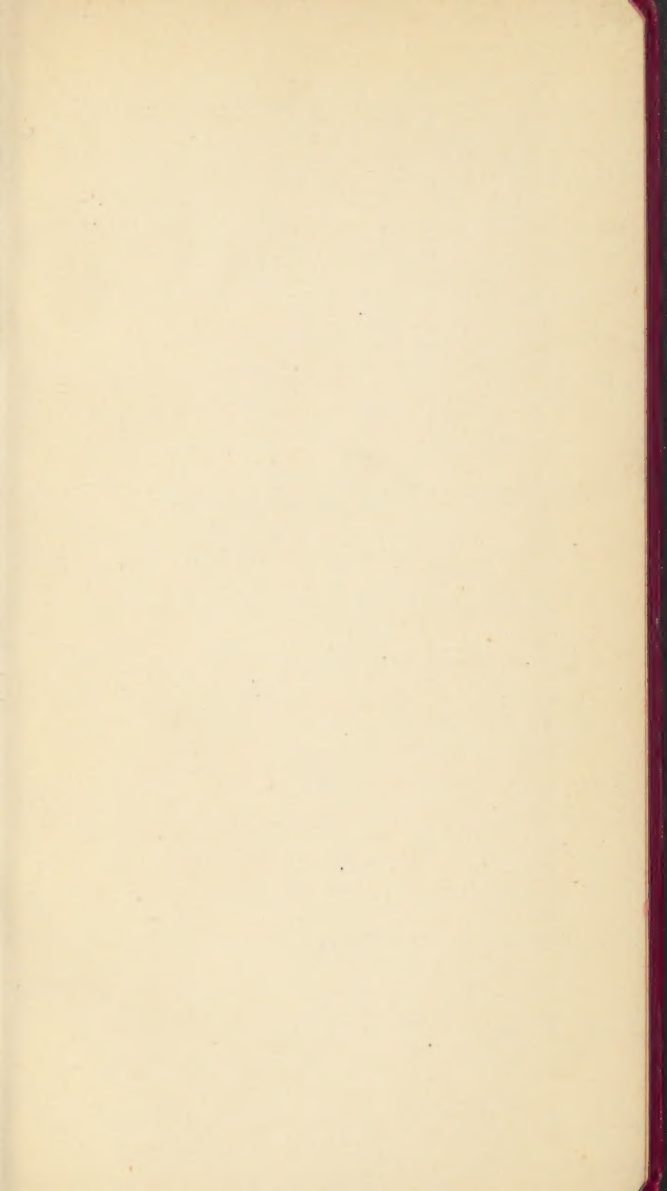
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